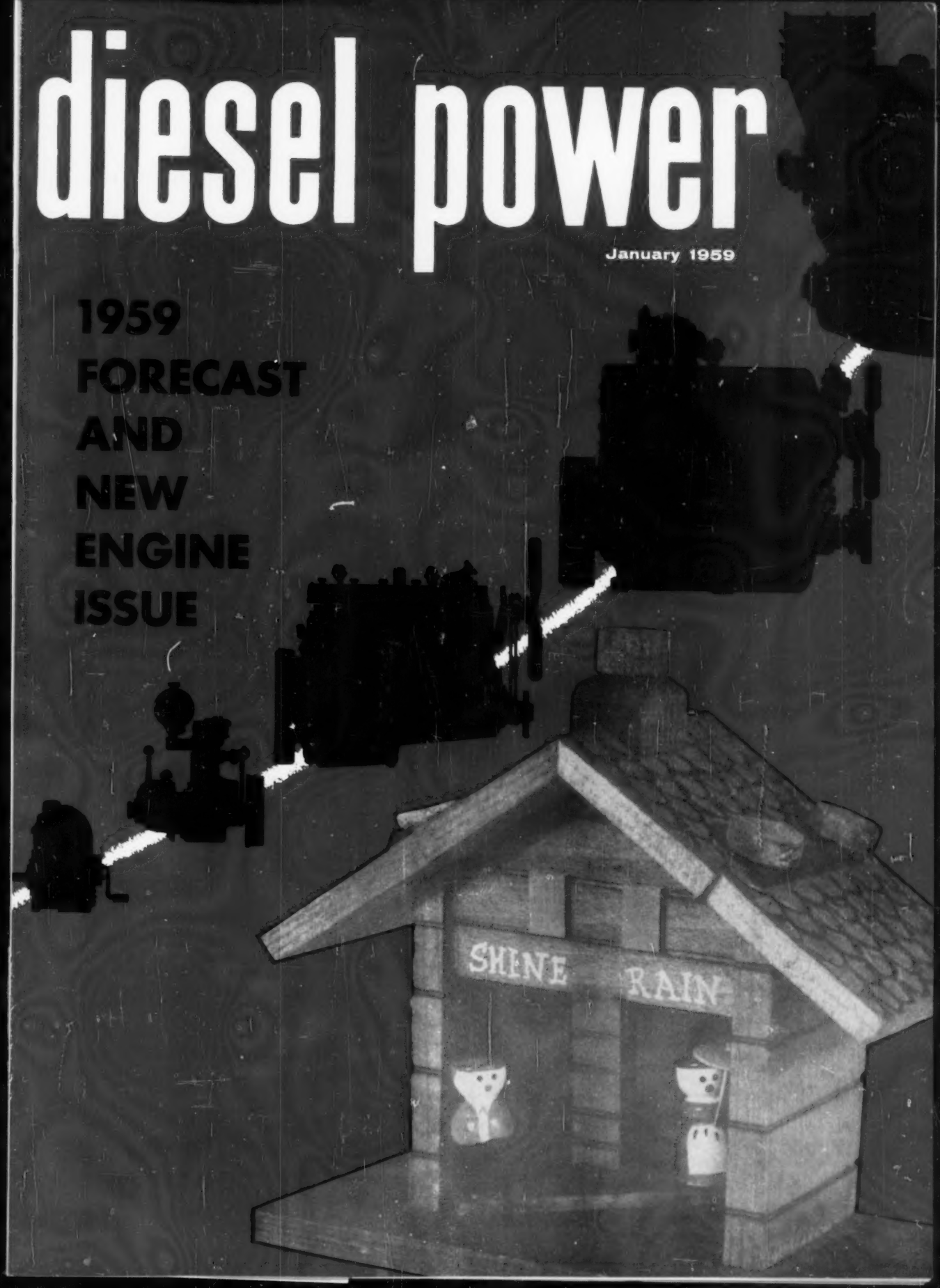
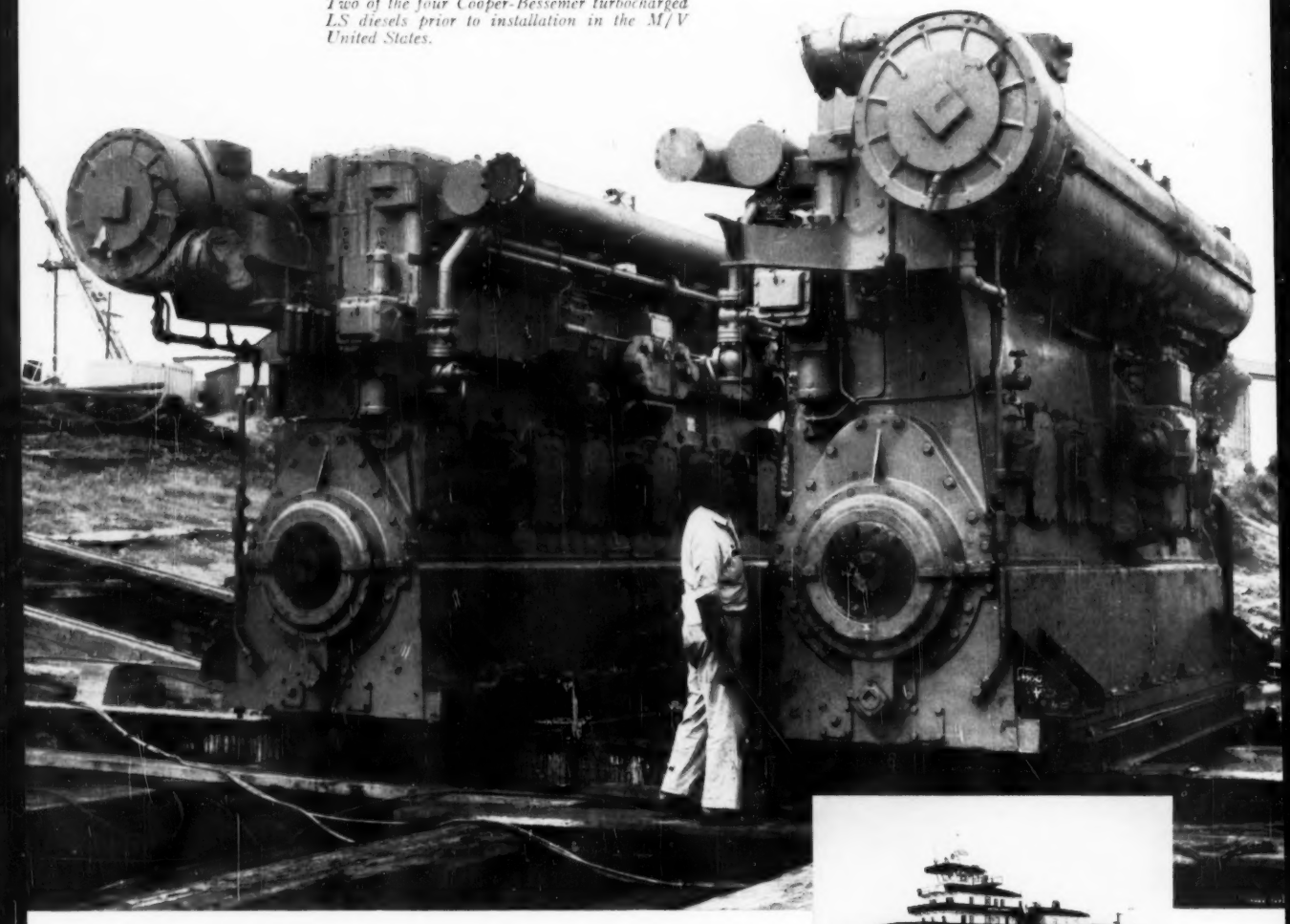
diesel power

January 1959

1959 FORECAST AND NEW ENGINE ISSUE



Two of the four Cooper-Bessemer turbocharged LS diesels prior to installation in the M/V United States.



8500 Cooper-Bessemer horsepower gives river shipping its biggest push

Federal Barge Lines' new *United States*, built by St. Louis Shipbuilding and Steel Co., is about to set cargo-moving marks on the lower Mississippi — thanks to the world's record power and speed of this mighty towboat.

Four Cooper-Bessemer turbocharged LS diesels give it an 8500 hp push—capable of moving 40-barge tows and of trimming 30% off running time on normal tows. Compared to towboats of 20 years ago, the M/V *United States* can push three times the tonnage! Further economy is provided by the design of the diesels to burn low-cost Bunker C fuel oil, saving an estimated $250 per day.

Regardless of your horsepower needs, you are assured peak performance with Cooper-Bessemer marine diesels because they provide the latest in engine advancements. Check the office nearest you when you start to plan. We are at your service!

BRANCH OFFICES: Grove City • New York • Chicago • Washington San Francisco • Los Angeles • Houston • Dallas • Odessa • Pampa Greggton • Seattle • Tulsa • St. Louis • Kansas City • Minneapolis New Orleans • Shreveport • Casper

SUBSIDIARIES: Cooper-Bessemer of Canada, Ltd. . . . Edmonton Calgary • Toronto • Halifax
Cooper-Bessemer International Corporation . . . New York • Caracas Mexico City
C-B Southern, Inc. . . . Houston

Cooper Bessemer

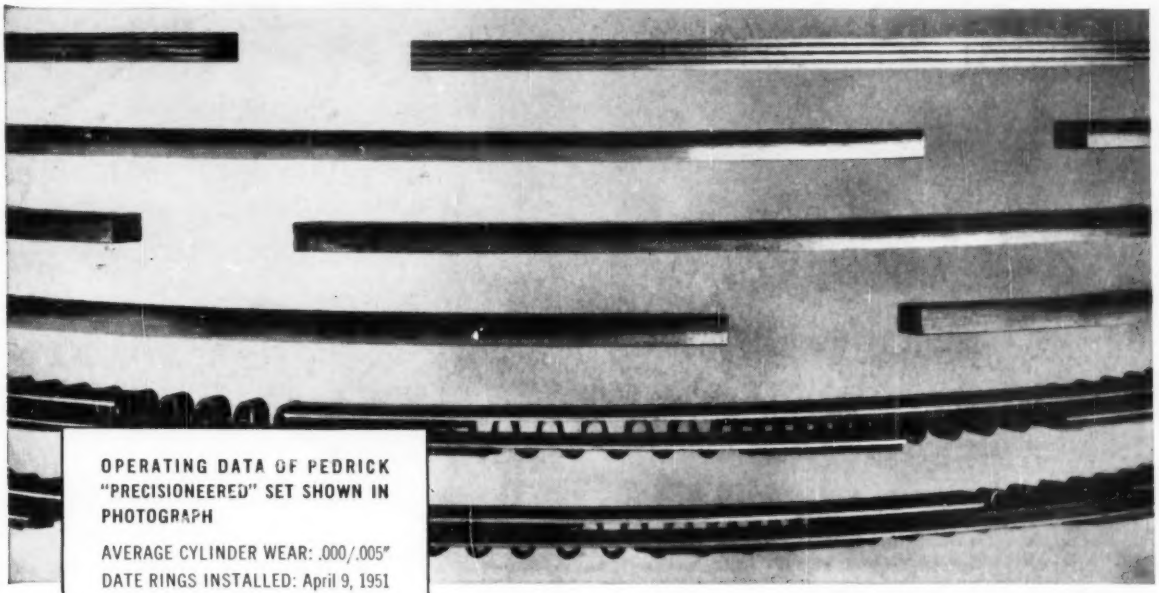
GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES · GAS · DIESEL · GAS DIESEL
COMPRESSORS · RECIPROCATING AND CENTRIFUGAL
ENGINE OR MOTOR DRIVEN

40,622 hours of operation

. . . an average of 6,350 h.p. hrs. per gal. total lube oil consumption.

The photograph shows Pedrick Piston Rings removed from a Cooper-Bessemer GMVTF 10 cylinder engine after 40,622 hours of operation. Note carefully how the face-wear on the rings (the bright area) extends only half way up. After more than six years of *full load* service, these Pedrick rings are practically as good as new.



OPERATING DATA OF PEDRICK "PRECISIONEERED" SET SHOWN IN PHOTOGRAPH

AVERAGE CYLINDER WEAR: .000/.005"

DATE RINGS INSTALLED: April 9, 1951

DATE RINGS REMOVED: June 27, 1957

TYPE LUBE OIL: DTE No. 3 MAGNOLIA

RATED HORSEPOWER: 1100

MAXIMUM OVERLOAD: 10%

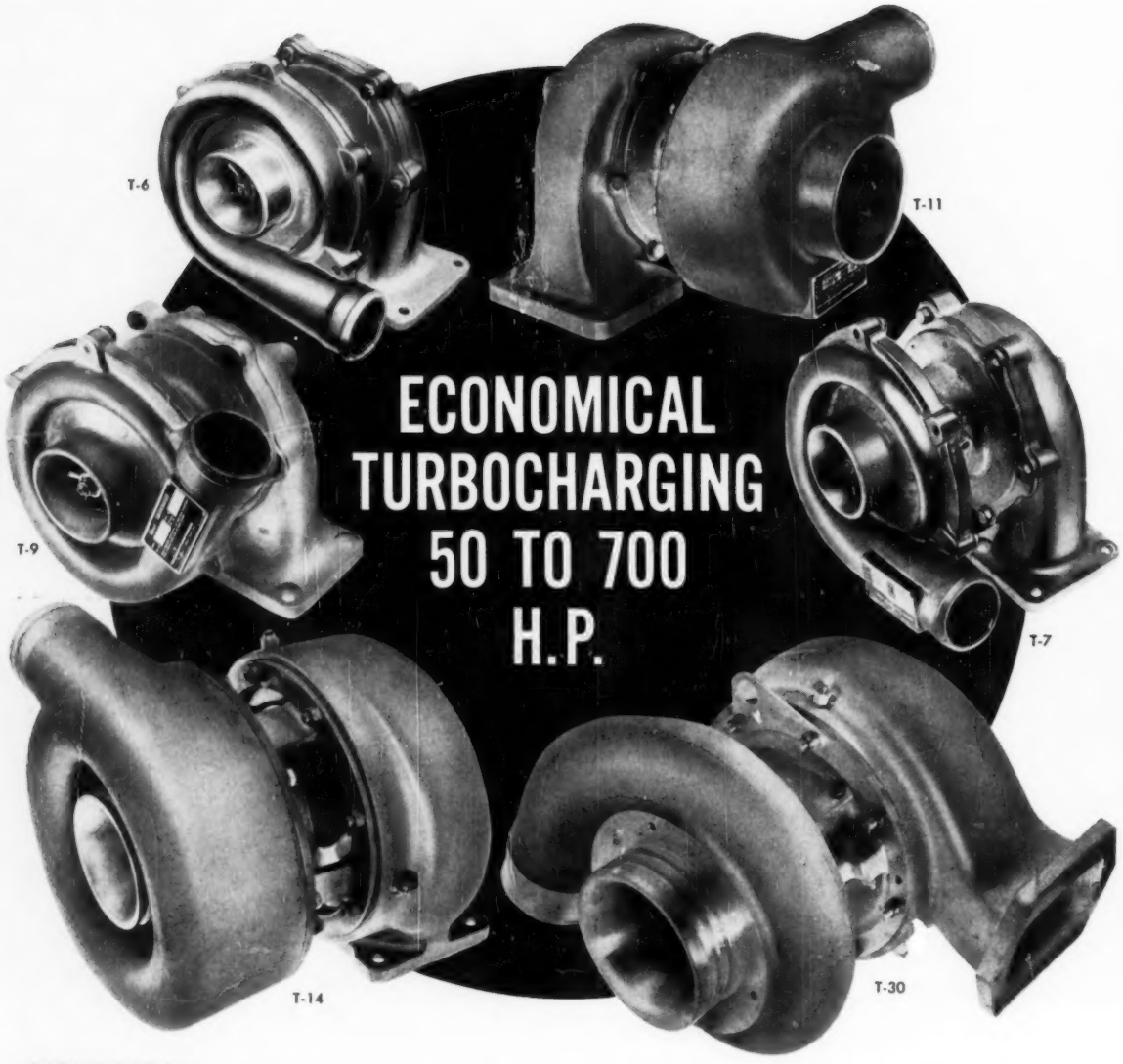
LUBE OIL CONSUMPTION: CRANKCASE—39,600 H.P. Hours per Gal. LUBRICATORS—(14 qts. per day) 7,530 H.P. Hours per Gal.

TOTAL LUBE OIL CONSUMPTION (CRANKCASE AND LUBRICATORS): 6,350 H.P. Hours per Gal.

For longer life at full power, make Pedrick "Precisioneered" Piston Ring Sets your *standard* replacement sets. You'll find your Pedrick engineer will be glad to call and help you solve any special problems. Write, wire or phone:
WILKENING MANUFACTURING CO., Phila. 42, Pa.
In Canada: Toronto 2.

Pedrick PISTON RINGS

PEDRICK PIONEERED CONFORMABLE PISTON RINGS FOR BIG-BORE ENGINES



AIRESEARCH now offers to the diesel engine manufacturer a complete line of turbochargers for automotive, stationary and marine engines covering the turbocharged range 50 to 700 horsepower for single installations. This family of improved turbochargers maintains excellent performance levels throughout the entire range of power, and allows greater ease of servicing through standardization and simplified design.

The reduced cost, light weight and high output of this turbocharger family enables the diesel industry to gain more horsepower per unit cost than has been possible before. They are especially effective in the low horsepower ranges where they make turbocharging of the smaller diesels economically practical for the first time. In addition, use of the AiResearch turbocharger control systems and intercoolers provides the most effective turbocharging available by accurately controlling turbocharger speed over its complete range regardless of changing load characteristics.

AiResearch has sold more than 20,000 turbochargers, accounting for more than six million horsepower now in operation, and is the largest and most experienced manufacturer of lightweight turbomachinery of all types.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

NEW AIR-COOLED DIESEL ENGINES

now available through HERCULES

THE JLO* SERIES

(pronounced "ee-lo")

Distributed in the United States by Hercules Motors Corp.

*Reg. TM of Jlo-Werke, G.m.b.H., Pinneberg, Germany

Check these outstanding features:

- **SIMPLICITY:** Jlo Series diesel engines are of 2-cycle design: eliminate valves, tappets, push-rods and camshaft for dependable, maintenance-free operation in their horsepower range.
- **LIGHTWEIGHT:** 2-cycle simplicity and judicious use of aluminum in construction reduce the weight of Jlo Series diesel engines to less than 15 pounds per horsepower!
- **ECONOMY:** Initial economy is coupled with maintenance economy since simplified Jlo Series design eliminates the problems of valve adjustments, and reduces cost of overhaul.
- **PERFORMANCE-PROVED:** Jlo Series air-cooled diesel engines have been used in every climate for every service in their power range. Fast-starting and rugged, they are ideal for both "stand-by" and continuous-duty operation.

FOR MORE INFORMATION
send for illustrated booklet

HERCULES

HERCULES MOTORS CORPORATION
Canton, Ohio

HERCULES ENGINES . . . *Sold and Serviced the World Over*

HERCULES MOTORS CORP.
Dept. 28A
CANTON 2, OHIO

Please send me more information on JLO Series air-cooled diesels and the name of my Hercules distributor.

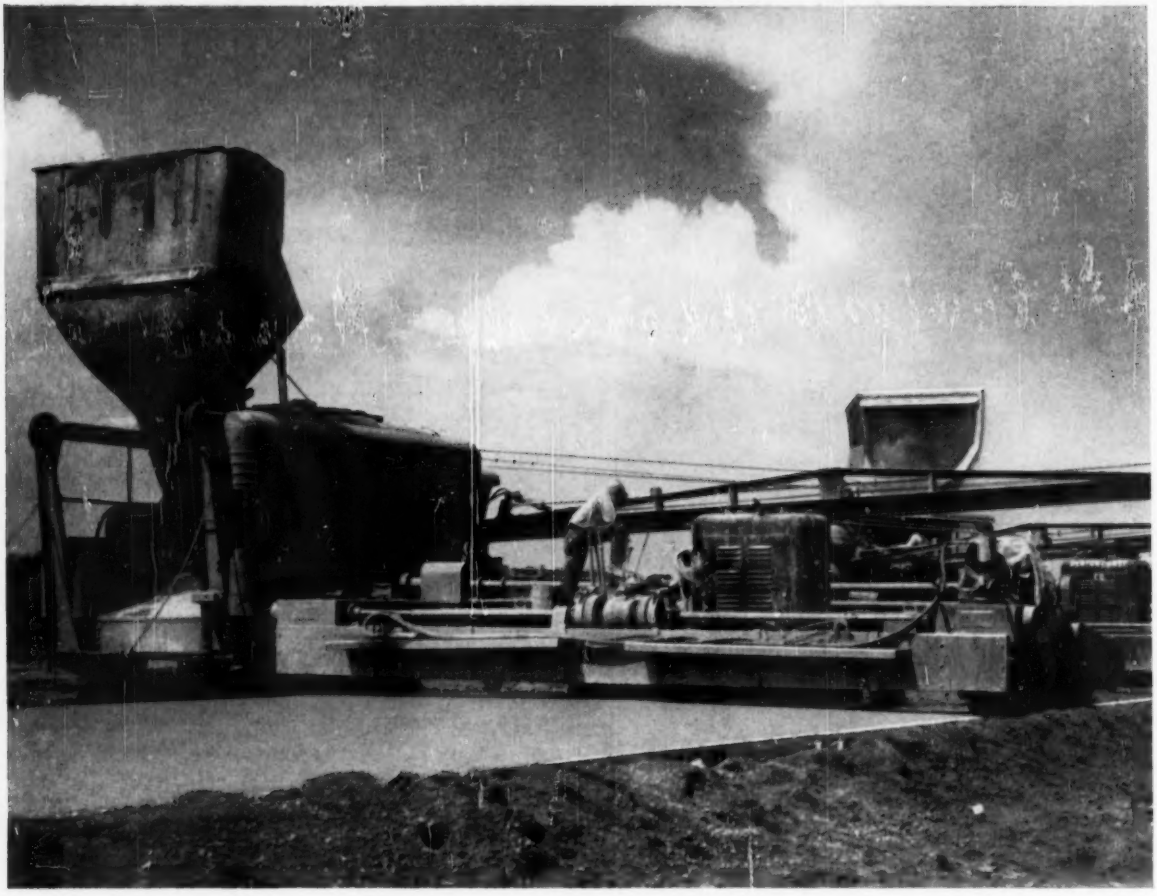
Name_____

Company_____

Address_____

City_____ State_____

CONCRETE EXAMPLE OF GENERAL MOTORS DEPENDABILITY



HARRISON-cooled Diesel power paves the way for new record of 6,029 feet of 9-inch concrete highway in 12½ hours

Harrison Heat Exchangers —Top-Quality Products of General Motors Research and Engineering.

You're always on the right road with Harrison! Whether you're unfurling a ribbon of highway in record time . . . or maintaining around-the-clock, heavy-construction schedules, Harrison takes complete control of vital operating temperatures. For example, a stretch of concrete 24 feet wide, 6,029 feet long and 9 inches deep was laid in 12½ hours, using Harrison-cooled Diesel power for the Rex pavers and portable batch mixing plant. Harrison heat-transfer equipment is rugged, reliable and highly efficient. That's why leading manufacturers specify Harrison heat exchangers for *all* types of Diesel applications. Harrison meets every cooling challenge with over 48 years' experience in the heat-transfer field. So, if you have a cooling problem, look to Harrison for the answer.

TEMPERATURES MADE TO ORDER

HARRISON

AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

GM GENERAL MOTORS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

editors notes...

'ou'll want to read about...

forecast of diesel engine activity 1959. Outlook for engine sales good due to two factors: siness in general will be better d our industry has strengthened position in the power field. merchandising setup is better and ore closely geared to the user's eds. And the product is better . . . .

ew engines for 1959. It looks like l the engine companies spent 1958 signing new models. International arvester has a new one (Pg. 30) at is quite a departure from their arlier models. Open combustion amber, new injection system and her new design features all add up new performance levels . . . .

llis-Chalmers has done it too. an engine with and without turbo-arging (Pg. 36) they've come out ith a new combustion chamber that roduces one of the lowest fuel con-mption curves for an engine of this ze that we've seen . . . .

/e report on driving a diesel-powered ar (Pg. 39). Believing in diesels r all sorts of light commercial hicles, we got a Mercedes-Benz 180D see what it was all about. Now, e're more firmly convinced that iesels have a big place in the taxi nd light truck field . . . .

etroit Diesel has really done it g. 46). A new 53 Series and expansion f the 71 Series to include V-6's, V-8's, -12's and V-16's. With the 53, 71 nd 110 Series, they have single-engine ower from 20 to 675 hp and with wins (turbocharged) to 1650 hp. heir "E" (economy) design has pulled own fuel consumption.

diesel power

Established in 1923 **Vol. 37, No. 1** **January, 1959**

The Magazine of Piston and Turbine Power

Editorial

We're Impressed 19

Special Feature

1959 Looks Good 25

Articles

IH's D-817 Engine—Its Most Powerful 30
A-C's 16000 and 21000 Engines 36
Driving A Diesel Car 39
Detroit Diesel's "Family of Engines" 46
New Engine, Two New Locomotives For EMD 52
Cat Has Two New Models 54
Cummins Adds Two Small Engines 57

Departments

Highlights 20
Industry News 60
New Products 64
People and Plants 68
New Literature 74
Consolidated Index Of 1958 DIESEL POWER Articles 79
Advertisers Index 82

Diesel Publications, Inc., 80 Lincoln Avenue, Stamford, Conn.

You'll want to read about . . .

EMD's new turbocharged 567D, so new that full technical details are not available yet (Pg. 52). It's being used in a new 2400-hp freight locomotive. Also, they have a low-cost, simplified locomotive for the export market . . . .

Cat also introduced two new models this month (Pg. 54). They're leaner and cleaner than earlier models but their power and efficiency is right up there . . . .

Cummins is looking harder at the smaller engine field. They've just brought out two small units (Pg. 57) with an eye on the small commercial vehicle and farm tractor fields. They'll find other application too.

That's it for this month. Its very significant that so many new and better engines all broke at the same time. These companies are sure that the diesel is here to stay and are backing their conviction. Better products will make deeper penetration in existing fields and some of these engines are aimed at new fields. It's going to be an interesting year to watch.

Brian P. Emerson
Editor

Joseph S. Cascio
Associate Editor

James E. Jones
President

Emma Corris
Circulation Mgr.

Wilmajeanne Bryant
Production Mgr.

Sid Winter
Art Director

Midwestern Office
Howard Sharp, General Manager
Chet Mozden, District Manager
Room 206
605 N. Michigan Ave.
Chicago 1, Illinois
Tel: Michigan 2-5050

Pacific Coast Representatives
M. D. Pugh and Associates
P. O. Box 635
Altadena, Calif.
Tel: SYcamore 7-2894
Hunter Vinton
1050 Lincoln Ave.
Palo Alto, Calif.

Southwestern Representative
The Runnels Company
Ralph W. Runnels
5210 Morningside Drive
Houston 5, Texas
Tel: JAckson 4-6633

British Representatives
Newspaper Representations Ltd.
231-2 Strand,
London, W. C. 2, England

German Representative
Linder Presse Union GmbH.
Wittelsbacher Alle 60
Frankfurt/Main, Germany

Publisher
G. Renfrew Brighton

Assistant Publisher
Wilbur W. Young

Subscription Rates

	Single Copies	1 year	2 years	3 years
U. S.	75¢	$4.00	$7.00	$ 9.00
Canada	75¢	4.00	7.00	9.00
Foreign	$1.50	8.00	13.00	17.00

Back Issues — Twice Published Price

Diesel Power is indexed regularly by Engineering Index, Inc. and is available in microfilm editions from University Microfilms, Inc., Ann Arbor, Michigan.

DIESEL POWER, for January, 1959, Vol. XXXVII, No. 1. It is published monthly by **DIESEL PUBLICATIONS, INC.**, Executive and Editorial Offices at **80 LINCOLN AVE., STAMFORD, CONN.** Tel. DAvis 4-2131. Entered as second class matter at the Post Office, Kutztown, Pa., under Act of March 3, 1879. Copyright 1958, Diesel Publications, Inc.

BPA

diesel power

Established in 1923 **Vol. 37, No. 1** **January, 1959**

The Magazine of Piston and Turbine Power

Editorial

We're Impressed 19

Special Feature

1959 Looks Good 25

Articles

IH's D-817 Engine—Its Most Powerful 30
A-C's 16000 and 21000 Engines 36
Driving A Diesel Car 39
Detroit Diesel's "Family of Engines" 46
New Engine, Two New Locomotives For EMD 52
Cat Has Two New Models 54
Cummins Adds Two Small Engines 57

Departments

Highlights 20
Industry News 60
New Products 64
People and Plants 68
New Literature 74
Consolidated Index Of 1958 DIESEL POWER Articles 79
Advertisers Index 82

Diesel Publications, Inc., 80 Lincoln Avenue, Stamford, Conn.

the spirit of 76...

THE SPIRIT OF '76 . . . exemplifying strength —dependability—determination to move forward through the years.

Wyman-Gordon enters its 76th year still forging ahead with new forging techniques—still meeting the challenge of the seemingly impossible in this age of power and speed on the ground—in the air—and in outer space.

It is a far cry from the modest beginning in 1883 to the forging industry's most modern testing and research facilities in the extensive laboratories of Wyman-Gordon today—assurance of the ultimate in forging quality.

From the high wheel bicycle through the "horseless carriage" days to the "Mach era" of aircraft and space vehicles, Wyman-Gordon has marched under the standard of "The Greatest Name in Forging."

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

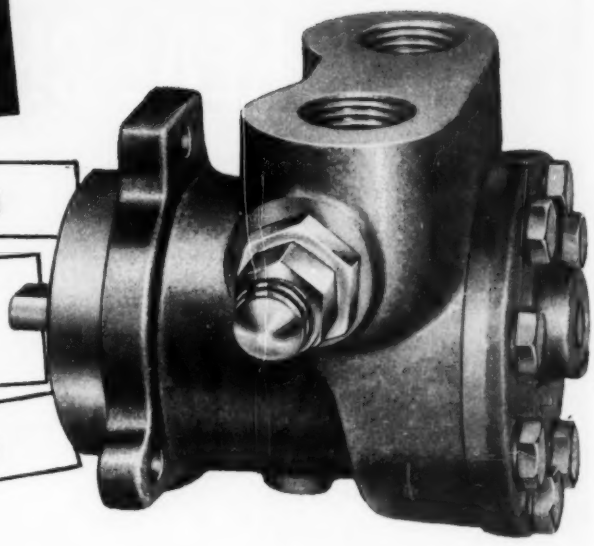
WORCESTER 1, MASSACHUSETTS
HARVEY, ILLINOIS • DETROIT, MICHIGAN

NOW

Compact design

Complete mounting interchangeability

Built-in relief valves



on TUTHILL small industrial pumps

Now a new design—Series LPFV—gives you even greater flexibility with Tuthill small industrial pumps . . . the industry standard for dependable operation for many years.

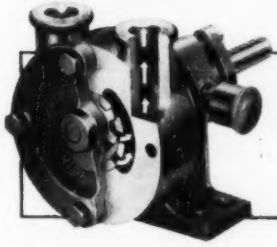
Complete interchangeability allows the use of any one of five different sizes in the series on the same mounting arrangement. Capacities range from 20 to 360 gallons per hour, at pressures up to 500 psi. Normally provided for 1800 RPM, 3600 RPM speeds are permissible in most cases. And a built-in relief valve is now offered as optional equipment on all LPF models.

Compactness, an outstanding characteristic of all Tuthill pumps, is particularly exemplified in the new model LPFV with its shorter mounting hub. It is also available in close coupled motor-pump combinations for applications where space and weight are at a premium.

The newly designed model LPFV incorporates the performance-tested operating characteristics of Tuthill's internal gear construction described at right. In thousands of applications . . . in hydraulics, lubricating, transfer, circulating and other services . . . Tuthill internal gear pumps have established enviable records for reliability and quiet operation.

Over 700 models of Tuthill internal gear pumps are available to provide one especially suited to your application. These include stripped models for built-in applications, cartridge pumps, reversible models . . . a host of specialized pumps for each individual service. Mail the coupon today.

Tuthill Manufactures a Complete Line of Positive Displacement Rotary Pumps in Capacities From 1 to 200 GPM; for Pressures to 1500 PSI; speeds to 3600 RPM.



TUTHILL internal gear pumping principle

In Tuthill internal gear pumps, proven in 30 years of operation, there are only two moving parts. The principle is based upon the use of a rotor, idler gear and a crescent shape partition cast integral with the cover. Power applied to the rotor is transmitted to the idler gear with which it meshes. The space between the outside diameter of the idler and the outside diameter of the rotor is sealed by the crescent. As the pump starts the teeth come out of mesh increasing the volume. This creates a partial vacuum drawing the liquid into the pump through the suction port. The liquid fills the spaces between the teeth of the idler and the rotor and is carried past the crescent partition to the pressure side of the pump. When the teeth mesh on the pressure side the liquid is forced from the spaces and out through the discharge port.

Tuthill Pump Company
945 East 95th Street
Chicago 19, Illinois

☐ Please forward information on LPF series
☐ Please have your representative call

Name_____ Title_____

Company_____

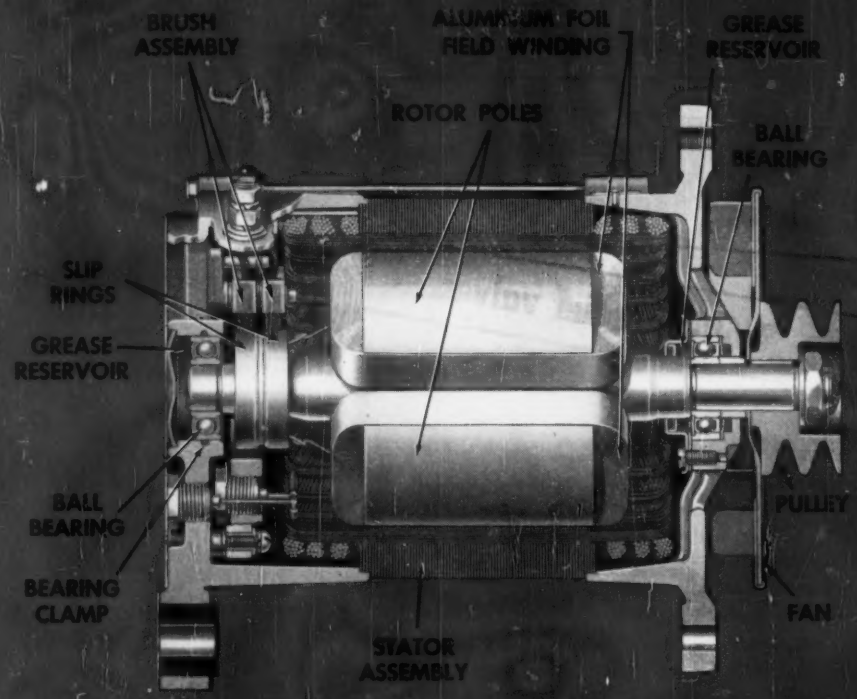
Address_____

City_____ State_____

TUTHILL PUMP COMPANY

945 East 95th Street, Chicago 19, Illinois

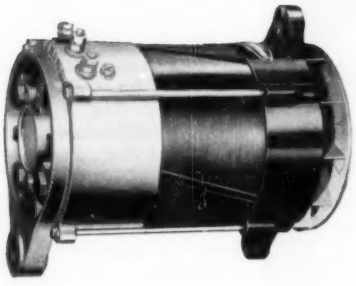
NOW! REAL CHARGE-AT-IDLE,

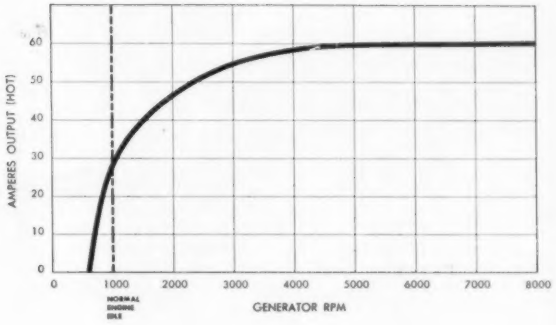


PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE

UP TO TWICE THE TOTAL OUTPUT

WHEN YOU REPLACE STANDARD D.C. EQUIPMENT WITH DELCO-REMY'S NEW SELF-RECTIFYING A.C. GENERATOR





Here's a completely new generator from Delco-Remy *specifically designed* to take care of cars and trucks with extra-heavy electrical loads under all traffic conditions . . . to increase battery life by eliminating deep cycling.

Designed to mount interchangeably with most standard d.c. generators, this compact new unit is only 5¾" in diameter and weighs just 31 pounds. The a.c. design eliminates commutation problems, providing extra-long brush life . . . and the ball bearings are "lifetime" lubricated so that no attention is required between engine overhaul periods. Six specially developed silicon rectifiers built into the end frame eliminate the need for space-consuming external rectifier units, reducing installation time and cost to a minimum.

Be sure to specify this new self-rectifying a.c. generator along with its companion transistor regulator (either full or transistorized model) on your new special-duty equipment for 1959. This all-new power team is still another example of Delco-Remy progressive engineering at work for you.

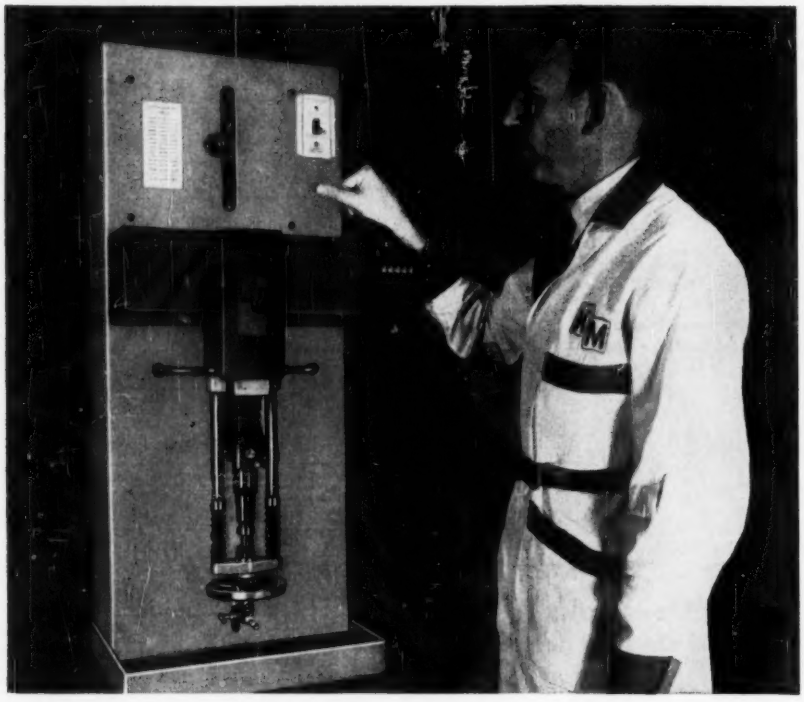
GM GENERAL MOTORS

GENERAL MOTORS LEADS THE WAY—STARTING WITH **Delco-Remy** ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Better Injectors... Lower Cost...

NEW KENT-MOORE SERVICE EQUIPMENT SPEEDS OVERHAUL AND REPAIR OF GM DETROIT DIESEL INJECTORS



GM Detroit Diesel Injector Comparator Tests performance under simulated operating conditions. Eliminates all guess-work in overhauling and rebuilding injectors to factory specifications. When used with Injector Tester, the condition of all operating parts can be determined. Unnecessary replacement of parts eliminated. With Kent-Moore's J 7041 Diesel Injector Comparator you "road test" GM Injectors right in your shop!

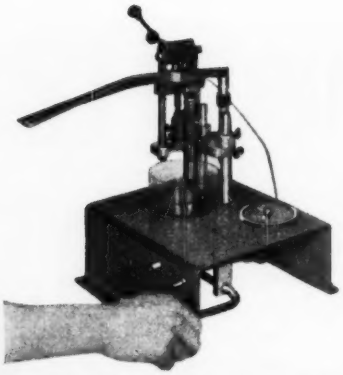
Developed in cooperation with the engine manufacturer, the K-M Injector Comparator measures actual output of new, used or rebuilt injectors by testing them at a fixed speed at a specified number of strokes with filtered fuel supplied at uniform service pressure.

HANDLES ALL SERIES 71 AND 110 INJECTORS

Now you can scientifically test new or rebuilt injectors before building them into the engine—and you can even match-up sets of GM injectors with uniform delivery rates for the best engine performance!

SEND FOR BULLETIN—Write for full data on these and other Kent-Moore special service tools and equipment.

Trade in your old injector tester! K-M Testers purchased within the last three years are worth $75.00 to you! Older models or any make of pump-type testers, bring $25.00 trade-in allowance.



INJECTOR TESTER FOR POPPING, SPRAY PATTERN, HIGH AND LOW, AND PRESSURE LEAKS. The redesigned J 7509 Injector Tester used rigid steel tubing to closely regulate the circuit's volume of fluid. Microfilters eliminate dirt, the greatest single element of injector trouble, and a special cam-operated clamp supplies just the exact amount of pressure for perfect sealing during test. The J 7509 Tester will handle both standard body and offset body Series 71 injectors.

ADAPTER KITS. The J 7510 adapter kit is composed of a quick-clamp and support plate designed specifically for standard body Series 110 Injectors. For the offset body Series 110 Injectors, the J 7511 Adapter Kit is used. These parts are installed on the J 7509 Injector Tester in place of the Series 71 unit.

INJECTOR ASSEMBLY FIXTURE. The J 6868 Injector Assembly Fixture provides a quick-clamp fixture to retain the Series 71 Injectors for repair or reassembly. Jaws are available to fit all Detroit Diesel Injectors.

JAWS AND SUPPORT ASSEMBLIES. Jaws and support assemblies are available to adapt the J 6868 Injector Assembly Fixture to handle all the Detroit Diesel Injectors. J 7505 Standard body Series 110, J 7784 Offset body Series 110, J 7506 All Seri-

KENT-MOORE ORGANIZATION, INC.

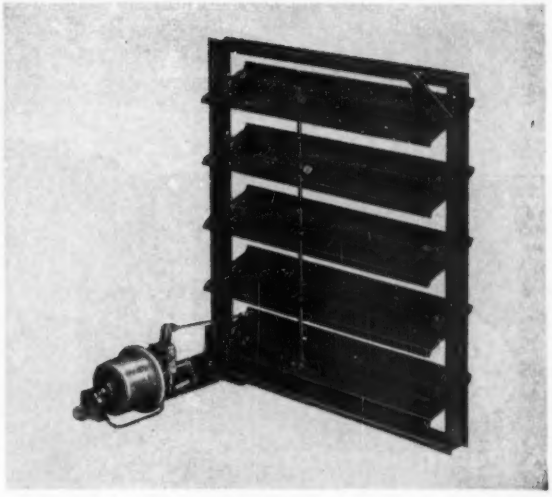
28635 MOUND ROAD, WARREN, MICHIGAN 58-F-6

ENGINEERS AND MANUFACTURERS OF SERVICE TOOLS AND EQUIPMENT

HONEYWELL DAMPERS—SHUTTERS

... built to your specifications for accurate, dependable air flow control

Get the *exact* shutter, damper or louver you need from Honeywell. Specify any style or type, any blade materials and setting, any edging materials, any operator-mounting arrangement. Louver, round or right angle mixing types available for pneumatic, electric or manual operation. Whatever your needs, you're assured smooth, uniform performance when you specify custom-made Honeywell shutters for dependable air flow control.



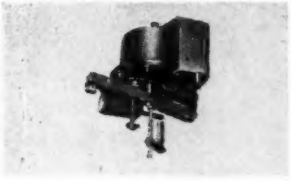
... AND SHUTTER OPERATORS

... ruggedly built for precise positioning — electric or pneumatic

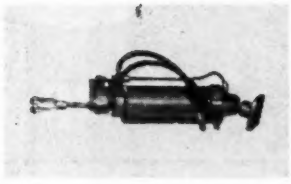
There's an electric or pneumatic motor for every shutter application in the all-inclusive Honeywell line. Two or more motors can be operated in sequence or in unison. Motors can operate two or more shutter sections, provided the combined shutter load doesn't exceed motor capacity. Available for two-position or proportioning control.

Call your nearby Honeywell field engineer for a discussion of your needs. He's as near as your phone. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

PNEUMATIC MOTORS



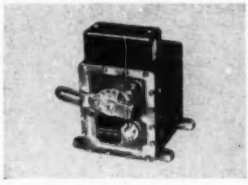
Grad-U-Motor shutter motor. Three sizes, for operating up to 48 sq. ft. of shutter area.



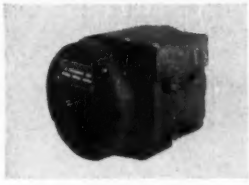
Heavy-duty, piston type ***Grad-U-Motor.*** For operating up to 96 sq. ft. of shutter area.

Air-O-Motor diaphragm motor. Three sizes, for operating up to 310 sq. ft. of shutter area.

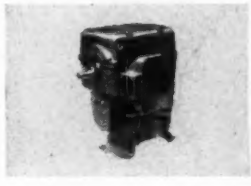
ELECTRIC MOTORS



Modutrol motor operates up to 70 sq. ft. of shutter area.



Actionator operates up to 100 sq. ft. of shutter area.

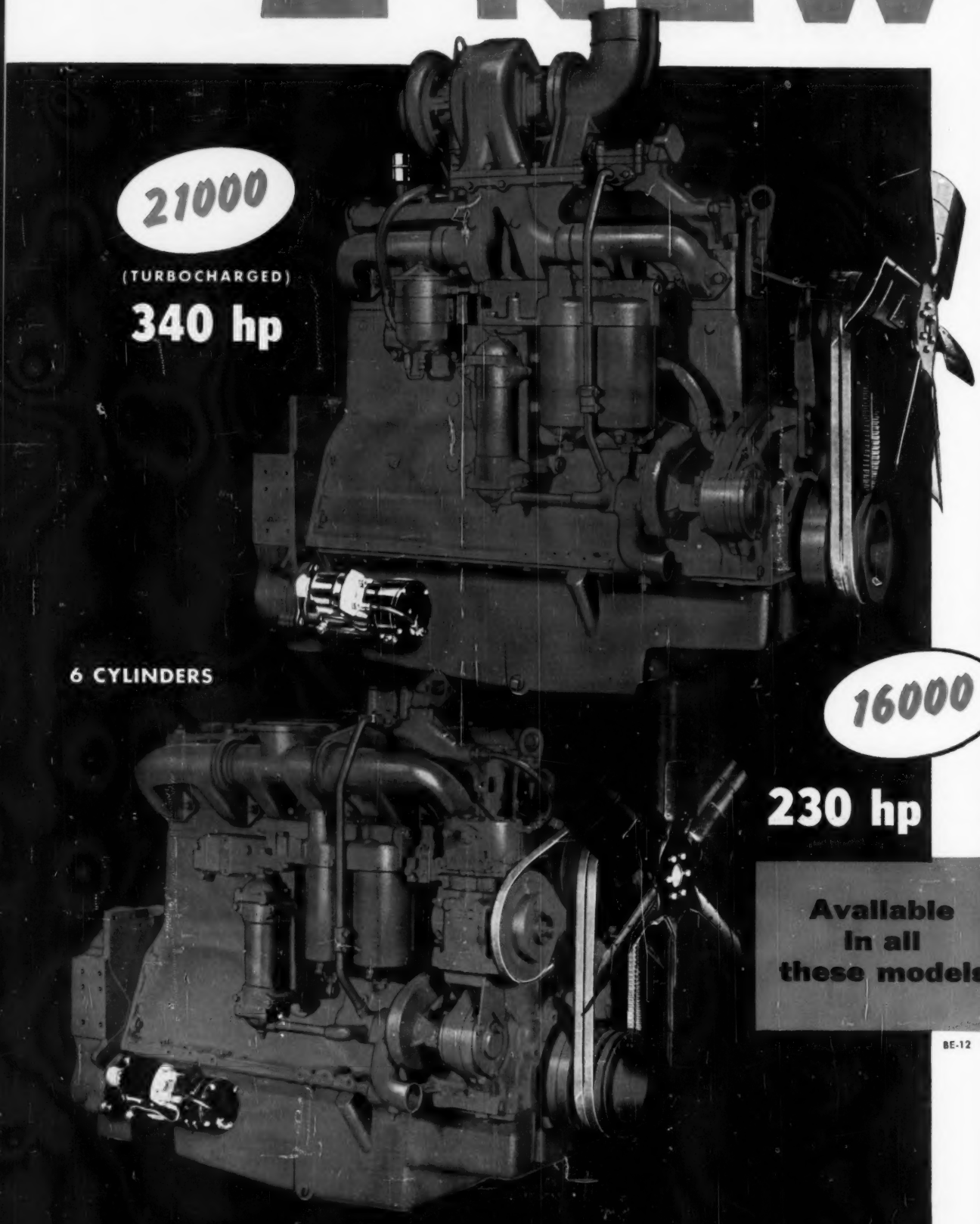


Series 831E Industrial Motor operates up to 370 sq. ft. of shutter area.

Honeywell

First in Control.

2 NEW



21000

(TURBOCHARGED)

340 hp

6 CYLINDERS

16000

230 hp

Available In all these models

BE-12

DIESELS

that give you

More Horsepower

With 340 hp in the turbocharged 21000 and 230 hp in the 16000, you have the reserve power to operate smoothly and efficiently under extreme load conditions.

More Torque

. . . throughout the operating speed range. Torque is consistently high . . . provides the "umph" to do the job . . . walks into and *through* heavy loads.

Clean Design

Modern engineering means greater dependability, less maintenance, easy installation. To further simplify servicing, there is 98 percent interchangeability of parts between the Allis-Chalmers 16000 and 21000 engines.

Clean Exhaust

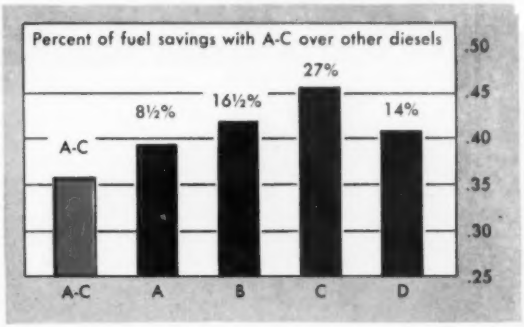
These diesels have a new combustion system* that provides *thorough* mixing of air and fuel for complete combustion. Fuel makes horsepower — not smoke!

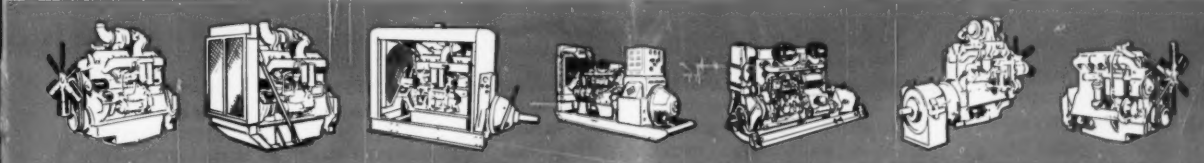
*Write for full details on Allis-Chalmers' new combustion system.

Greater Fuel Economy

This chart compares fuel economy of the new Allis-Chalmers engines to others in their class. Economy like this gives you from 1 to 2½ hours of extra production a day doing the same kind of work — using even less fuel.

FUEL CONSUMPTION
Pounds per brake hp hr





Let your Allis-Chalmers dealer show you the many other features that put the *profit* in performance. Write for FREE new 16-page bulletin BU-540. Allis-Chalmers, Milwaukee 1, Wisconsin

ALLIS-CHALMERS

POWER FOR A GROWING WORLD

6 REASONS WHY IT PAYS TO STANDARDIZE ON ROBERT BOSCH INJECTION NOZZLES

® Reg. U. S. Pat. Off. ROBERT BOSCH GMBH Stuttgart

1: Leadership: ROBERT BOSCH Fuel Injection Equipment made the high-speed diesel engine practicable.

2: Consistent quality: Unmatched record of performance on literally millions of engines.

3: Widest selection: ROBERT BOSCH offers the most complete line of nozzles available.

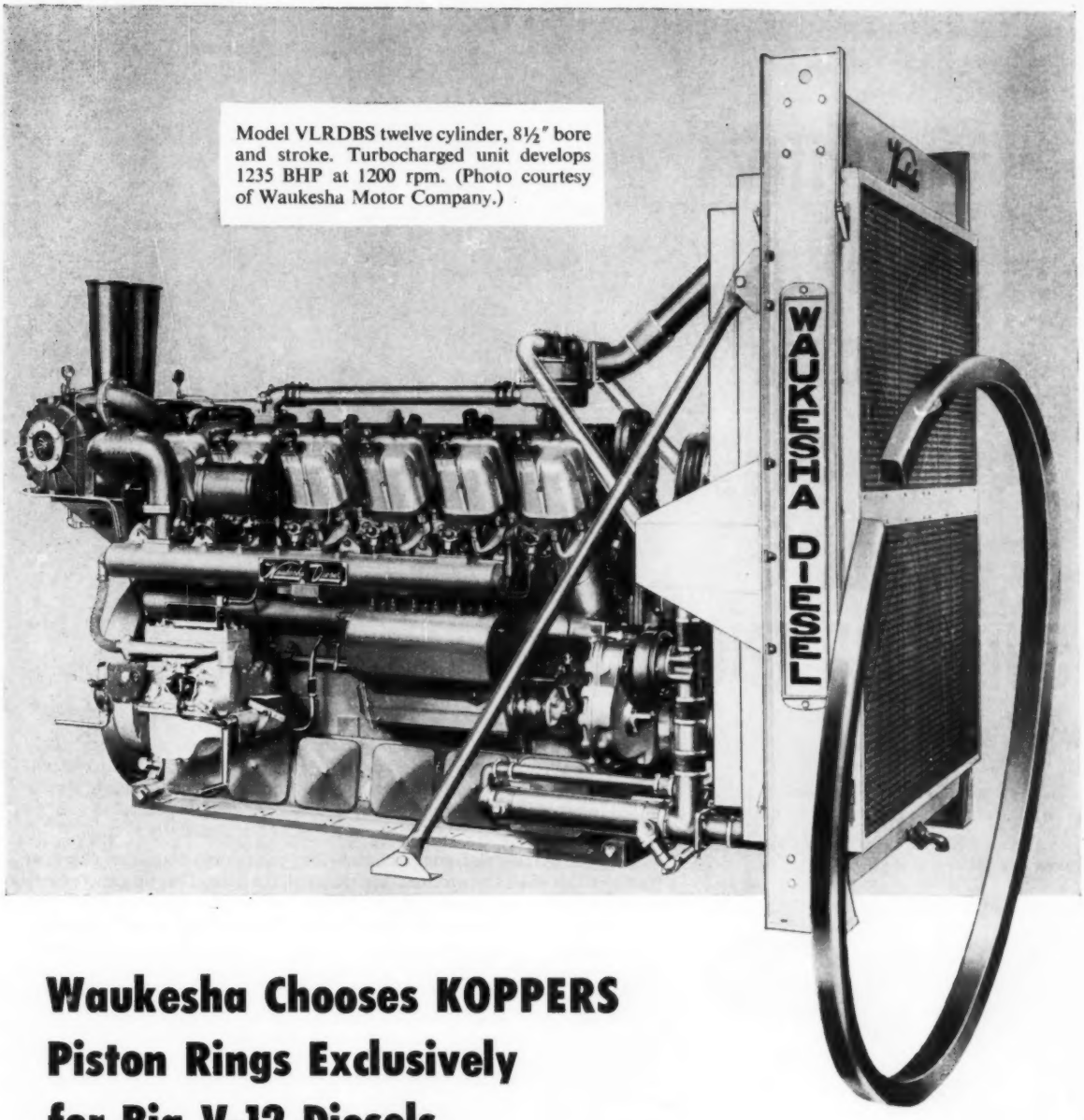
4: Service everywhere: Not only nation-wide, but world-wide.

5: Standard equipment: Leading gasoline and diesel engine manufacturers here and abroad use ROBERT BOSCH equipment for their most advanced designs.

6: Higher quality at lower price: Sets new standards of long-life efficiency—yet actually is priced lower.

ROBERT BOSCH CORPORATION

Long Island City, N.Y. San Francisco, Calif.



Model VLRDBS twelve cylinder, 8½" bore and stroke. Turbocharged unit develops 1235 BHP at 1200 rpm. (Photo courtesy of Waukesha Motor Company.)

Waukesha Chooses KOPPERS Piston Rings Exclusively for Big V-12 Diesels

Waukesha's VLRDBS supercharged diesels are perfectly suited for applications such as oil rigs, excavators and tugboats where a surge of reserve power is essential for emergency and overload demands.

This recent series of diesels manufactured by the Waukesha Motor Company, of Waukesha, Wisconsin, is designed to develop tremendous power under the severest operating conditions . . . the kind of power that puts a premium on piston ring performance. Waukesha has selected Koppers Piston Rings as have other manufacturers who must be certain of reliable component performance.

This dependability is yours when you rely on Koppers with their complete range of materials . . . wide selection of types and sizes . . . rigid quality control and careful inspection. These factors contribute to Koppers unchallenged leadership in producing the finest piston and sealing rings for industry.

Instead of undergoing needless expense in solving ring problems, take advantage of Koppers experience, research facilities and craftsmanship. Write for information today. KOPPERS COMPANY, INC., Piston Ring and Seal Dept., 1301 Hamburg St., Baltimore 3, Md.

★ **KOPPERS DEPENDABLE RINGS CONTRIBUTE TO WAUKESHA'S RELIABLE PERFORMANCE UNDER THE MOST RUGGED CONDITIONS.**

KOPPERS

AMERICAN HAMMERED
Industrial Piston Rings
Engineered **Products Sold with** ***Service***

thrifty cities protect power budgets with SUPERIOR ENGINES

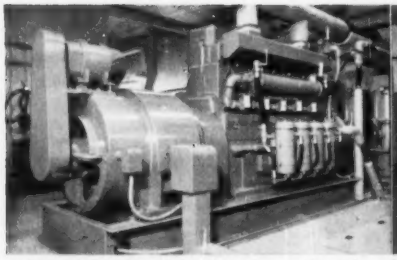
More and more cities with budget-conscious administrators are wisely specifying White Superior diesel or gas engines for water, sewage treatment and power plants. They find that both fuel and maintenance costs are reduced whenever these dependable, economical engine generator sets go to work as prime power, supplementary power or standby power.

Singly or in multiples, compact, completely self-contained Superior power packages consistently produce high output for size. Diesels can operate continuously on non-premium fuel, while gas engines perform efficiently on natural, LP or free sewage gas. Because Superior has simplified engine construction to the highest degree possible—and uses only the most rugged, high quality parts—fewer replacements are required and maintenance is reduced to an absolute minimum.

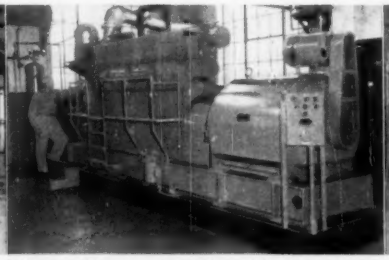
White can custom-engineer Superior engines to your exact requirements and apply its extensive experience with automatic, unattended and remote control operations to your problem. If your requirements range from 215 to 2150 horsepower, or 150 to 1500 KW, call on White Superior engines to protect your power budget!

White Diesel

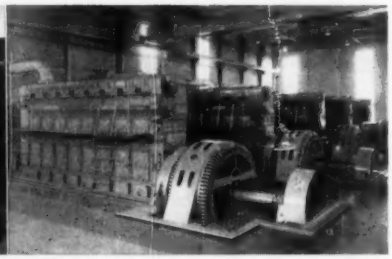
WHITE DIESEL ENGINE DIVISION, WHITE MOTOR COMPANY, Plant and General Offices, Springfield, Ohio



ALBUQUERQUE, NEW MEXICO . . . Superior 6G-825 gas engine generator set (250 KW) at Sewage Disposal Plant No. 1. Engine operates on sewage gas and/or natural gas.



LIMA, OHIO . . . Superior 40-SX-8 diesel engine generator set (500 KW) at city waterworks. Unit is on duty as standby power.



TUCSON, ARIZONA . . . Five Superior 80-GDSX-8 dual-fuel engine generator sets (each 1000 KW) at TRICO Electric Co-op Inc. County-wide power for farming and residential requirements.

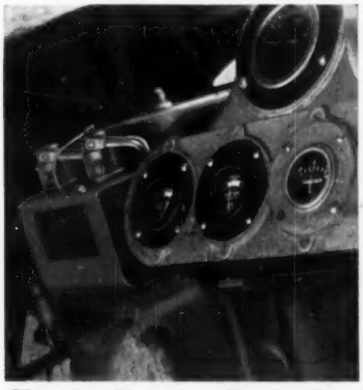
ENGINEER'S FIELD REPORT

PRODUCT **CHEVRON PRESSURE PRIMER SYSTEM**

FIRM **JONES-TOMKINS CO.**
Cougar, Washington

Special cartridge fires giant diesel in seconds

At world's highest earth-filled dam construction site near Woodland, Washington, three giant diesel shovels get immediate starts from Chevron Pressure Primer System, reports Jones-Tomkins, general contractors. System helps speed shovel's fill-borrowing operations for this $51,000,000 project. Five-year-old 4500 Manitowoc Speed Crane (above), powered by Caterpillar 350 h.p. V-12 D397 engine, operates 18 hours a day, six days a week, loading 21-yard dump trucks in just 70 seconds. Jones-Tomkins uses Standard fuels and lubricants exclusively on this job.



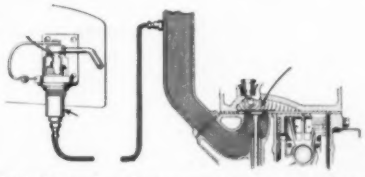
Chevron Pressure Primer Discharger mounted on instrument panel (left) operates satisfactorily despite heavy vibration, reports shovel foreman Henry Watson (right). "We've had absolutely no trouble with this system. The Chevron Pressure Primer System eliminates dust clogging and allows fluid to reach the cylinders quickly. It's the practical way we've found to get these rigs going."

CHEVRON

TRADEMARKS "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

Why Chevron Pressure Primer System assures fast starts



- Volatile Chevron Priming Fuel atomizes in induction system at all temperatures even at -65°F, no hand-pumping required.
- Pressure or weakest spark from engine fires mixture.
- Simple rugged air-tight discharger prevents Priming Fuel leakage.
- Small, fireproof, pressurized steel cartridges protect Priming Fuel from water and dirt.

For More Information or the name of your nearest distributor, write or call any of the companies listed.

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

The Piston with "Double Bonded" "Ni-Resist Iron" Top Ring Section STOPS! RING GROOVE WEAR!

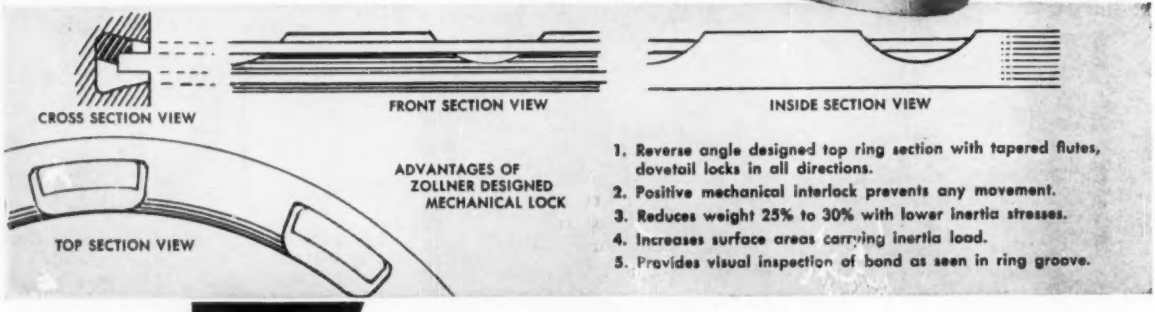
BOND E LOC*

Exclusively **DOUBLE BONDED**
METALLURGICALLY Al-Fin Process
MECHANICALLY Zollner Lock

Keeps Engines Powerful Longer —at Lowest Cost

"A sensational development — the greatest mileage piston we have ever used." Everywhere, engine builders and transport operators enthuse over the performance of Zollner Bond-O-Loc Pistons. Top ring groove wear problems are eliminated by the "Ni-resist" Iron section *permanently* incorporated with the double bond of *both* A1-Fin metallurgic *and the exclusive* Zollner mechanical lock. Separation failure is impossible. For longer piston life and lower maintenance cost, we suggest your immediate test of Bond-O-Loc advantages.

*T.M. Reg. Pat. App. For



1. Reverse angle designed top ring section with tapered flutes, dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

ADVANCED ENGINEERING

PRECISION PRODUCTION

COOPERATION with Engine Builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER CORPORATION • Fort Wayne, Indiana

Editorially speaking -

We're Impressed

When researching an issue such as this one, one by-product is a number of impressions. You scout statistical sources, review what you've collected through the year, do a lot of reading and talk to people. You start putting the pieces together and pretty soon patterns begin to emerge. Paths you can follow clearly become trends; these you use in your projections. Important, but perhaps less definite, are the impressions you're bound to get. Here are a couple. We've sensed a greater confidence that the market is there—it's a matter of going after it both sales-wise and product-wise. We're in an industry that, fortunately, does not have model years. So we thought it significant that we could report on new engines of six companies, involving some 16 models, in a single issue! Even this isn't the whole story. Some new models have just been reported and additional ones are due within a short time. Harnischfeger has a vee engine coming up; Hercules will have some news soon and Waukesha has a new unit up its sleeve. Now, these engines were not developed just to keep designers off relief rolls; the companies mean business and each engine was designed with a particular market in mind. Another strong impression is that our industry is becoming more realistic. Their thinking is less rigid and they are quicker to change in response to customer preferences and needs, as well as to meet competition. Typifying this, look at recent changes in combustion chambers. Once, proprietary designs were almost sacred. They were the best and that was all there was to it. Now, several designs of long-standing and much defending are not appearing in new models. Why? Look at some of the fuel consumption curves on the new engines. Production-type injection equipment is also starting to make a dent in that top sacred item, the proprietary injection system. All these changes are important within themselves in terms of costs and performance. We see the willingness to change as of equal importance. It's good for the industry and for the user—a good parlay to bet on.

BPE

highlights

Availability of abundant nickel supplies makes long-range planning for its use in our field practical. Nickel iron and sheet alloys with high hot strength, high corrosion resistance and good wear qualities can be used for many engine parts and accessories.

Several Russian locomotive developments were reported at the recent ASME Annual Meeting. They are said to have prepared designs for a 6500 and a 7500-hp gas-turbine locomotive, each to be 2-unit, 6-axle. They are also studying locomotive designs using free-piston engines. It is also reported they have 1,500,000 miles of operation on producer-gas locomotives. Coal is burned to produce gas that is supplemented by diesel fuel for starting. The engines are turbocharged diesels.

Free power for the natural gas industry is provided by using waste energy. A new-type Troy engine acts as a reducing valve between the high pressure of a gas dehydrator discharge line and lower pressure feed to a transmission pipe line. Acting as an expander, no gas is consumed or lost to atmosphere. One such 60-hp engine is driving a 500-gpm pump at LaGloria Oil Gas Co., Houston, Texas.

Rock Island made national news when they recently reduced long-haul passenger rates. Good equipment could be one reason this was possible. In another class of service, two EMD Aerotrains (1200-hp locomotive, 400 coach seats) recently went into suburban service. These "Suburbanites" added to the "Jet Rocket" give the Rock Island one of the most modern commuter fleets in the country. Other new equipment includes eight 1750-hp EMD GP-9's scheduled for 2nd quarter delivery.

The trucking industry is evaluating microwave communications. Authority to operate such a system is being requested from the FCC by two carriers. Central Freight Lines and Red Ball Express wish to build and operate an experimental system between Dallas and Ft. Worth. Purpose is to discover what uses a privately-operated microwave system may hold for the trucking industry. In addition to teletype and voice communication, closed-circuit television and facsimile transmission is planned.

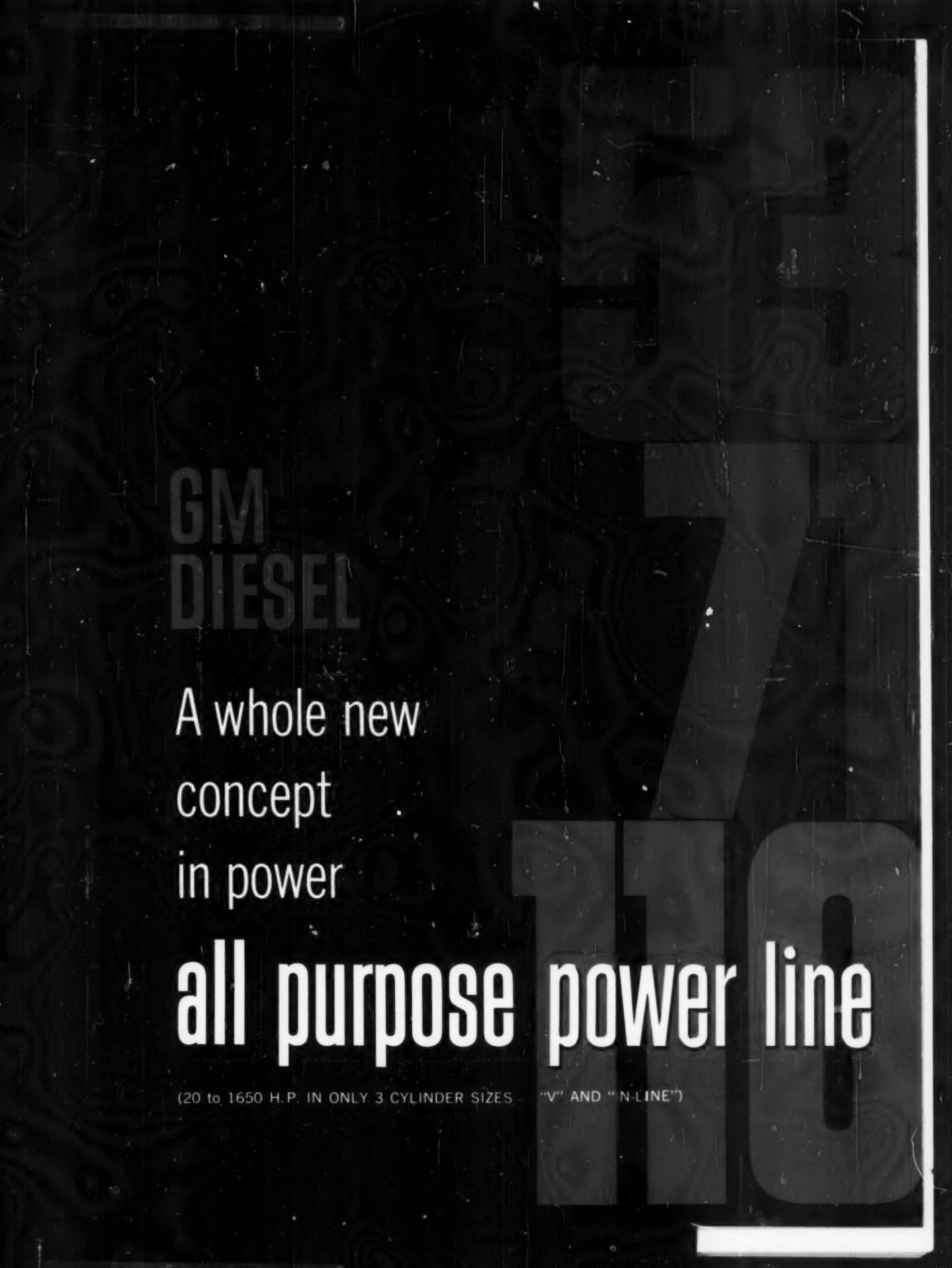
The Union Pacific is optimistic on passenger travel. This railroad is expanding its service and investing nearly $7-million in new equipment. New, more-comfortable equipment plus additional and faster schedules are the latest means used by this railroad in a building for increased passenger business.

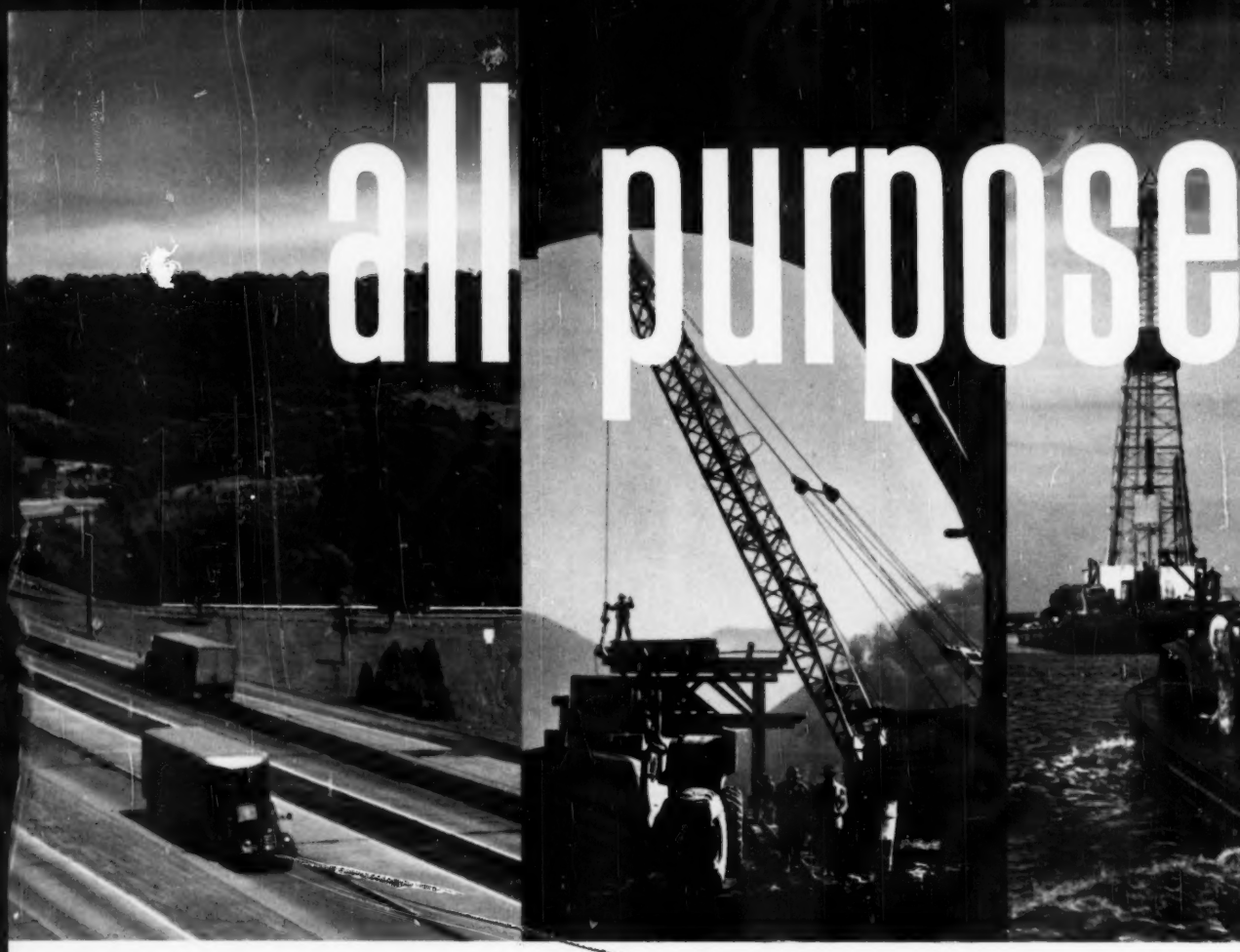
A trailer interchange agreement which makes possible travel coast to coast and border to border without changing trailers has been approved by the ICC. This agreement also makes clear to operators the exact costs and benefits to be expected from this interchange system. About 350 common carriers are already participating and many more are expected to join.

Sidewalk superintendents got a break when contractors made it possible for them to see diesel construction equipment in action. An access road and parking area, 200 x 300 ft, for spectators use has been completed close to the $6,500,000 barge canal lock and bridge under construction in West Sacramento, Calif. The public can see a dredge and other diesel equipment in action as well as a working model of the harbor area.

Construction volume may reach $72-billion in 1959 according to the Associated General Contractors of America, Inc. This forecast is divided into $52.2-billion in new construction and nearly $20-billion in maintenance and repair. Work in 1958 is estimated at nearly $49-billion in new construction and $18.6-billion in maintenance and repair, a total of $67.5-billion. The 6% increase seen for 1959 will be the largest advance in four years.

Philadelphia's "Operation Northwest" is aimed at increasing the use of mass transportation. A rail-and-bus ride combination gives riders a reduced combination fare and stepped-up schedules. Main objective of this 6-month experiment is to foster a return to mass transportation to relieve traffic and parking congestion. The $160,000 set aside by the city to help cover "out-of-pocket" expenses the transit lines may incur is far less than the amount that will be saved by the city if the plan works. Its good business for the transit lines too.


GM
DIESEL
A whole new
concept
in power
all purpose power line
(20 to 1650 H.P. IN ONLY 3 CYLINDER SIZES "V" AND "N-LINE")



GM Diesel combines 8 New Basic "V" and "in-line" engines wit

To help industry fill its power needs, GM Diesel engineers have developed the most comprehensive power concept since they pioneered the small 2-cycle Diesel.

Using only 3 cylinder sizes, they have more than doubled the number of basic engines – vastly increased the horsepower range – yet maintained the family relationship and parts interchangeability for which GM Diesels are famous.

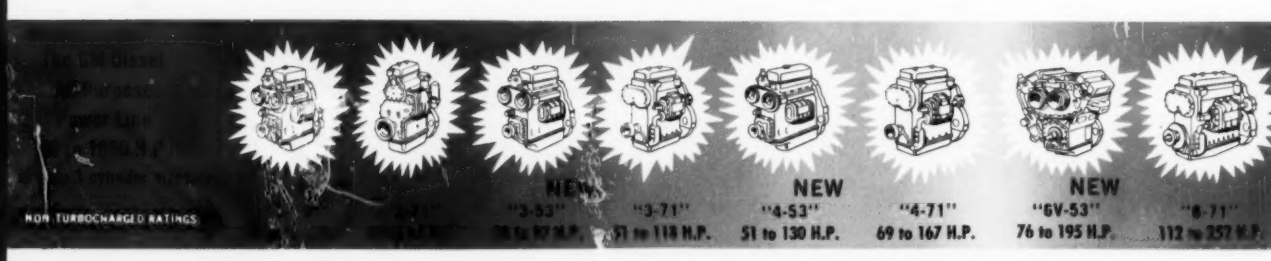
Each engine features the ultimate in *compactness, light weight, high efficiency, durability and inexpensive maintenance.*

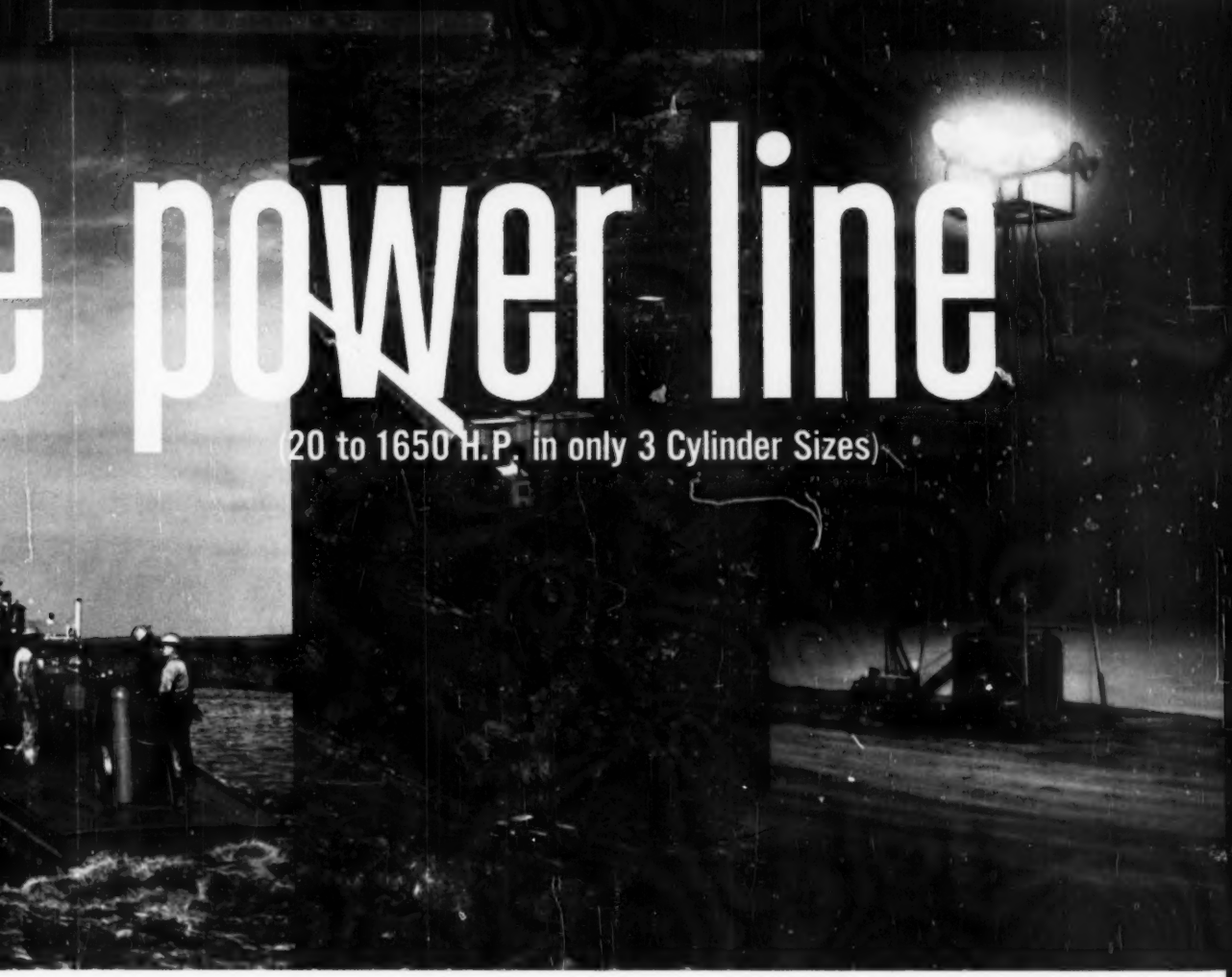
Basing their design on that of the versatile and capable GM Series 71 Diesel, GM Diesel engineers have created 8 new basic "V" and "in-line" engines which will add vastly new power coverage to the present Series 71 and 110.

First, the new Series 53 Diesel—comprising four basic "V and "in-line" engines—is a smaller, more compact version the famous "71."

Here, at last, in the Series 53, are Diesels which cover the low horsepower ranges as never before. They hurdle the barrie which have limited the use of Diesel power in a whole host applications. They offer new opportunities for Diesel power farmers, boatowners and industrial users by making availab GM Diesels particularly suited to their needs. They will pa for themselves amazingly fast when they take over fro gasoline engines.

Four new "V-71" engines complete the additions—widen t power range of the "in-line" 71 Series—set new standards f low weight and small size per horsepower. These "V-7





with its proved "Jimmy" Diesels

engines bring far more power than ever before possible to the big brutes of the construction, mining, petroleum, logging and marine industries—up to 1650 H.P. when turbocharged.

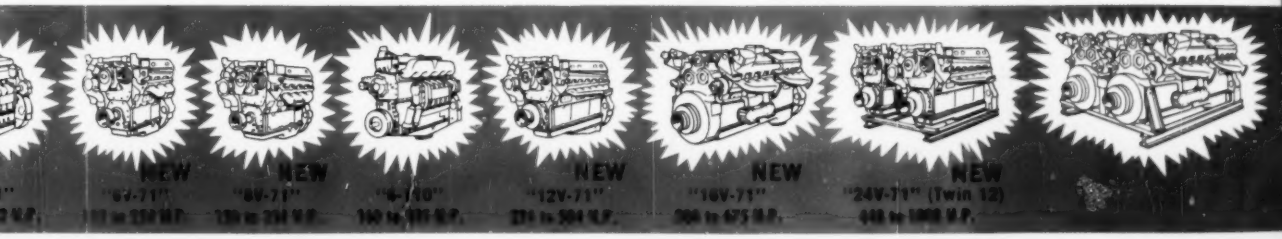
Production has started and complete programming has been established on all new engines. Non-turbocharged engines will be available first, followed later by Turbopower models to complete the power range.

So—now more than ever before, it pays to standardize on GM Diesel power. For whatever you want a Diesel to do, there's a GM Diesel to do it for you—faster, better, at less cost. Truly, here is a whole new concept in Diesel power—the All-Purpose Power Line. Get the full story by writing GM Diesel, Detroit 28, Michigan.

GM DIESEL

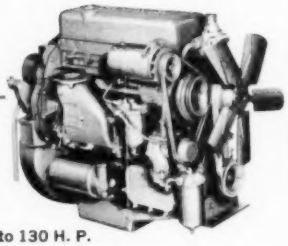
DETROIT DIESEL ENGINE DIVISION,
GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Parts and Service Worldwide



NOW...A "JIMMY" DIESEL for every power purpose

20 to 1650 H.P. in only 3 cylinder sizes

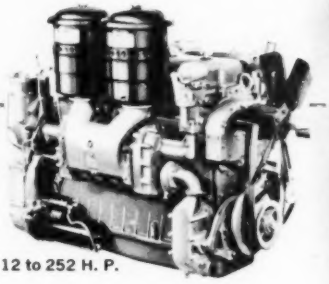


"4-53"—51 to 130 H. P.

NEW SERIES 53

—smaller Diesels millions can use
2, 3, 4 and V6—20 to 195 H. P.

A scaled-down version of the famous Series 71 GM 2-cycle Diesel—identical in design principles—the new 53 Series incorporates the time-proved features of patented GM unit fuel injection and uniflow blower scavenging in more compact, lightweight units. These spacesaving engines open up whole new fields of Diesel usefulness in trucks, buses, and taxicabs, in marine service, as well as in tractors, generators, loaders, lift-trucks and many other types of industrial equipment.

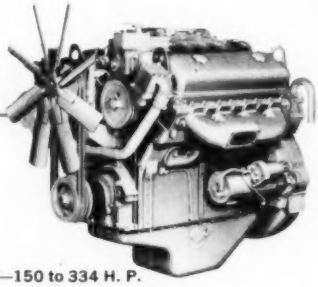


"6-71"—112 to 252 H. P.

SERIES 71 "IN-LINE"

—the versatile, time-proved economy Diesel
2, 3, 4, 6, Twin 4, Twin 6, Quad 6—33 to 1008 H. P.

Never, in industrial history, have there been Diesels as versatile and capable as the Series 71 GM Diesels—built in a wide range of Fan-to-Flywheel, Package Power, Torque Converter, Generator Sets, Economy truck engines and Turbopower models. And, because of GM Diesel's unique power concept—a family of engines featuring unequaled parts interchangeability—these time-proved "Jimmy" Diesels become even more valuable as key components of the GM Diesel All-Purpose Power Line. Today's "71" engines incorporate the results of 20 years' continuous improvement.



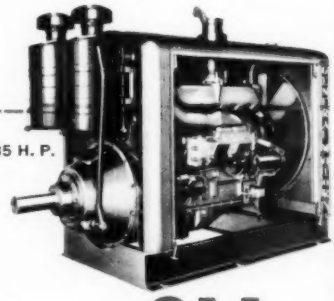
"8V-71"—150 to 334 H. P.

NEW "V-71"

—higher horsepower in smaller, more compact units
V6, V8, V12, V16, Twin V12, Twin V16—112 to 1650* H. P.

The new V-71 "Jimmy" Diesels are a further dramatic illustration of GM Diesel's mighty new power concept—rounding out the All-Purpose Power Line—yet retaining the GM family relationship and parts interchangeability. Here are engines destined to give you a better investment-earnings ratio than any you have ever had before. Diesels that boast the ultimate in compactness, light weight, high efficiency, durability, inexpensive maintenance and parts interchangeability.

*Turbopowered



"6-110"—160 to 335 H. P.

SERIES 110

—a favorite on heavy-duty jobs
6-110 and Twin-6-110—160 to 670 H. P.

Renowned for its ability to get big jobs done faster at lower cost, the GM "6-110" has stepped in and taken over thousands of jobs for every kind of business—done those jobs as never before—greatly expanded the usefulness of Diesel power. Built in single- and multiple-engine units, the Series 110 engine is available for a wide variety of heavy-duty applications in earth-moving, oil-field, railroad and marine equipment.

GM Diesel
Detroit 28, Michigan
Send me detailed information on new GM Diesel All-Purpose Power Line. I am interested in new Series 53 (.....), Series 71 "in-line" (.....), new V-71's (.....), Series 110 (.....).

NAME..... TITLE.....

COMPANY.....

STREET ADDRESS.....

CITY..... ZONE..... STATE.....

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

GM DIESEL

DETROIT DIESEL ENGINE DIVISION,
GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

Parts and Service Worldwide

Specifications subject to change without notice.

Litho U.S.A.

1959 Looks Good

All signs point to better business in 1959. Several factors combine to strengthen the diesel industry's position in tomorrow's market. Here's what has happened and what is happening that leads to the prediction that engine sales will be up in 1959.

BUSINESS should be better in 1959. So say the pundits who predict that more money will be spent for durable goods in the coming year —and diesels certainly rate as "durable." In assessing 1958, it cannot be classed as a total loss. In fact, impact of the recession was spotty. With diesels used in so many and such large segments of our overall economy, this is to be expected. Many constructive things were done in 1958, either because of or despite the recession.

Our optimism for 1959 stems from two sets of facts. The first can be classed as "national" and the second as being specific to our industry.

Defense spending will dominate our economy for a long time to come . . . our country has not stopped growing . . . increased government spending seems assured . . . some legislation and court decisions are favorable.

Perhaps "national" should be expanded since the basic global conflict stands like a colossus astride our entire economy. It will dominate it for a long time to come. Whether we like it or not, defense spending is a stabilizing "floor" underlying industry. And the military uses many diesels.

While our principle interest is in commercial use of engines and our sales predictions relate to this field, influence of military purchases cannot be ignored. Much of our engine and component development stems from meeting their needs. Also, many results find their way into commercial practice.

Several national factors appear to predict an up-trend in business. We'll highlight a few. The first and most basic is that our country has not stopped growing. More of everything will be needed. Diesels are heavily involved in production of raw materials, in certain types of manufacture and in every phase of transportation. As these industries expand, so will the need for diesels.

Recent elections and the imminence of the Presidential election will affect business. Increased governmental spending seems assured. In addition to defense spending, stimullous will be given to public works projects, the road-building program ($3.4 billion allocated as the Federal share for fiscal 1960 starting July 1, 1959) and other construction work. These are all fields of considerable diesel usage.

Favorable legislation at both state and national level, some passed and some pending, will improve the climate for increased engine usage in certain fields. For example, much attention has been given to more uniform and more realistic weight and length restrictions on trucks. Recent predictions of truck manufacturers, highway research officials and fleet operators foresee trucks hauling 96,000 lbs. This will require many changes, both legal and technical.

Legislation providing for $500,-million in government-backed loans to railroads for maintenance and purchase of new equipment should help finance new locomotives or remanufacture of older ones. The New York, New Haven & Hartford RR was the first to envoke the loan guarantee authority to finance purchase of 60 diesel-electric locomotives.

Recent Supreme Court reversal of the "Memphis Case" ruling will have considerable effect on and spur activities of the gas piplines. Industry spokesmen hail it as an important stabilizer and thus a basis for expansion plans. Essentially, this permits gas pipeline companies to file rate increases with the FPC and put them into effect pending FPC review. Under a ruling of a lower court in the "Memphis Case", rate increases could not be put in effect prior to FPC review unless gas customers agreed to the new rates in advance.

This changed established practice under which companies could put rate increases into effect, subject to possible later refund, after a 5-month suspension period. Pending final review, a process that could take up to several years, revenue was brought into closer alignment with expenses and gas pipelines were in a better position to finance operation and expansion.

Under the lower court ruling, some 34 companies faced the prospect of refunding something like $225-million collected in higher rates, even though the new rates might be approved when the FPC finished its review. Now, this is not necessary. As a result of this stabilizing influence, a lot of expansion plans will be dusted off and suppliers to the pipeliners can look for more business.

International developments and our commitments affect our industry . . . the free world is our market . . . advances in other fields create new engine applications

Before leaving the national scene, some comment should be made on the effect of international commitments on our industry. We face two necessities, (a) an economic and industrial offensive and (b) establishment of a tremendous defense complex. Since under-developed and even barren areas are involved, a key requirement is power. The free world has become our market.

We've seen some recognition of this fact in the number of foreign subsidiaries and other types of corporate structures set up by those in or serving the engine industry. Nationalistic aspirations in Africa, parts of Asia and other areas are opening up huge potential markets for diesel power and diesel-powered machinery. With the right products and imaginative selling, we should get our share of this business.

The nature of the defense complex has its own built-in market. More and larger prime-movers are being used in both conventional and brand new applications. Every missile installation, whether in the New York suburbs or on the Greenland icecap, needs prime-movers as an independant source of power. It is reported that from 50 to 90% of the cost of a missile weapons system goes for ground support equipment. As the complexity grows—and this occurs daily—more power is needed.

Just as an example, substantial horsepower is required at some far northern sites just for refrigeration! The problem lies in maintaining the stability of large structures built on permafrost, the permanently-frozen layer of material covering a large portion of the northern hemisphere. If building heat escapes to thaw parts of this layer, buildings settle. In some of the more complex installations, this is intolerable. Hence, the need for refrigeration around structural footings.

ESTIMATED DIESEL ENGINE SALES FOR 1959

(By applications other than military)

		Estimated Engines	Estimated Horsepower
Railroads	Horsepower Range 200-2400 Estimated Average 1200 H.P.	1,400	1,680,000 hp.
Highway Transportation	Horsepower Range 120-200 Estimated Average 140 H.P.	28,500	3,990,000 hp.
Marine	Horsepower Range 165-4800 Estimated Average 400 H.P.	2,500	1,000,000 hp.
Municipal & Utility	Horsepower Range 200-5000 Estimated Average 1250 H.P.	550	687,500 hp.
General Industry	Horsepower Range 60-3600 Estimated Average 100 H.P.	27,000	2,700,000 hp.
Petroleum	Horsepower Range 60-2400 Estimated Average 300 H.P.	4,500	1,350,000 hp.
Mining	Horsepower Range 60-550 Estimated Average 150 H.P.	4,700	705,000 hp.
Construction	Horsepower Range 60-550 Estimated Average 150 H.P.	45,000	6,750,000 hp.
Agriculture	Horsepower Range 30-180 Estimated Average 60 H.P.	44,000	2,640,000 hp.
TOTALS		158,150	21,702,500

Problems of arctic construction are not confined to the military. For example, as an outgrowth of the jet age, Denmark is currently constructing a commercial jet base in Greenland, complete with hotel. We've got a 49th State, too, that's bound to expand.

Ground power for jets, for fueling missiles, for tracking and controlling missiles and for powering special communication centers are all jobs that didn't exist even five years ago. It appears that new doors are continually opening for engine sales.

Now, what has the industry, itself, done that could affect its future? Let's look at our second set of facts.

Industry changes have been made . . . faith in the future is shown . . . more aggressiveness is evident . . . tradition is giving way to competition.

There's nothing like a down-trend in the sales curve to start some good healthy soul-searching. Viewing activities of various companies in the past year, it is evident that this has been going on. Decisions have been reached and acted upon. If you've been reading our "People and Plants" and "Highlight" departments, you'll have a good idea of where changes have been made and the direction of movement.

Some companies have gone through what amounts to complete reorganization. Others, obviously in a stronger position originally, have simply streamlined here and beefed up there. Company policies have been reevaluated, revamped where necessary and a definite course charted. Greater aggressiveness—and confidence—is being evidenced.

Confidence in the industry's future is shown in the large capital outlay for expanded plant capacity, new tooling and research facilities. Allis-Chalmers, Caterpillar, Cummins and Detroit Diesel are notable examples. Research and development throughout the industry has been intensified.

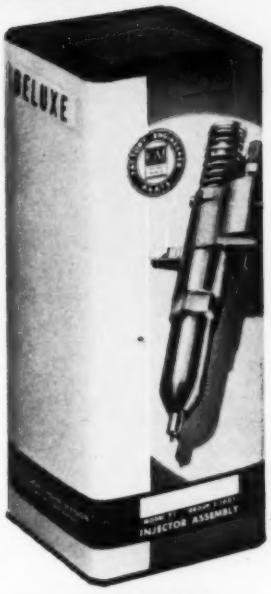
Once, diesels were unique and they established their own tradition. They

(*Continued on Page* 28)

NOW...

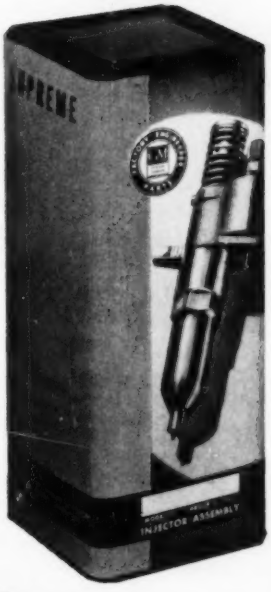
. . . from the world's largest distributor of diesel engines . . .

FACTORY APPROVED GM INJECTOR UNITS AT A NEW LOW PRICE



$900

DELUXE
Stewart & Stevenson INJECTOR EXCHANGE UNITS
Guaranteed to meet or beat the highest standards of the engine manufacturer. Guaranteed only genuine GM Parts used. GUARANTEED CUSTOMER SATISFACTION.



SUPREME
Stewart & Stevenson INJECTOR EXCHANGE UNITS
Containing all of the features of the Deluxe Injector Exchange line, PLUS a greater percent of all new parts!

$225.00

Stewart & Stevenson Injector exchange units are remanufactured in a factory approved and designed plant. All facilities and tooling are of the latest precision type.

Stewart & Stevenson Services fully guarantees every injector exchange unit and takes full responsibility for complete customer satisfaction.

It stands to reason that the company that sells more GM Diesel Engines and parts knows more about your demands for quality and good service from your injectors. Phone, wire, write today.

Limited quantity given available for [illegible] good [illegible] at repair shops.

STEWART & STEVENSON SERVICES, INC.

Main Office and Plant: 4516 Harrisburg Blvd., Houston 11, Texas. Phone CApitol 5-5341.
Branches: Corpus Christi, Dallas, Lubbock, San Juan, Odessa.
Representatives: San Antonio, Longview, Brownsville, Tyler, Pecos.
Export: Room 1405, 74 Trinity Place, New York, N. Y.

STEWART & STEVENSON

THE WORLD'S LARGEST DISTRIBUTOR OF DIESEL ENGINES

(*Continued from Page 26*)

were built the way the builder thought they should be built; they were sold in accordance with the ideas of the individual builder; and often he handled all parts and service. In short, it was a pretty individualistic operation. In the high-speed engine field, particularly, this all had to change. It had one basic flaw—it did not take the customer and his ideas into full account.

Today, even the most traditionally-minded companies are finding that diesels are just another form of power that must compete—hard and in every respect—with competitive forms of power. The high-speed diesel's competition, the automotive industry, has set the pattern and conditioned customers as to what they can expect. More diesel engine builders are recognizing this and are becoming more responsive to customer demands. Their pattern of distribution and of parts and service availability is tending to parallel automotive practices.

What, then, are some of the changes taking place in methods?

Merchandising is going "grass-roots" . . . markets are being found or created . . . service is being recognized as a sales tool . . . aftermarket growth brings parts competition

Responsiveness to customer needs implies that the manufacturer knows what these needs are. Who is in the best position to know the specific needs of an area—the factory or the distributor having daily contact with customers and prospects? The answer is obvious and explains why the trend in merchandizing is to go "grass-roots".

Some up-and-coming engine houses have been building their distributor organizations over the past year or two. Also, some have set up stronger regional factory offices with greater responsibility for sales and service in their areas. The whole object of this decentralization is to get closer to the ultimate user. New franchises, contracts, or whatever, have provided distributors more incentive to beat the bushes.

And it works. Take the case of Minneapolis-Moline that started such a program a year or so ago. Their reported sales for the 3rd quarter, 1958, was over double that of the same quarter of 1957, a year that was supposed to be much better sales-wise.

Strong and interested distributor—is finding new markets—applications where his engines can do a better, cheaper job. He finds a need and makes something to fill it.

Stewart & Stevenson's vertical pumping units are an example. The need was for irrigation pumping units that could be cheaply, quickly and easily installed. The answer was to stand the engine on end right over the well-head. Separate engine foundations, angle drives and shafting were eliminated. Several hundred were sold.

Part of this better distributor set-up is improvement in their shops. There's evidence that service is being recognized as a sales tool. One engine builder even has standard shop designs and layouts. It's surprising that it took so long in coming because almost invariably the man who sold *real* service with his engines had the bulk of business in his area. Check the ones around you and see if it isn't so.

While service sells engines, it also sells parts. Growth of the diesel aftermarket attracted independent parts manufacturers and now engine builders are in competition for the parts business. Stronger distributorships with better shops, coupled with more realistic discount structures to independents, are helping them hold more of this business.

Not only do many companies have better facilities for selling but they have a better product to offer. Today's engines are not only technically better but meet a wider variety of needs.

New capabilities mean new markets . . . penetration of existing markets is deeper . . . reduced cost of ownership improves competitive position

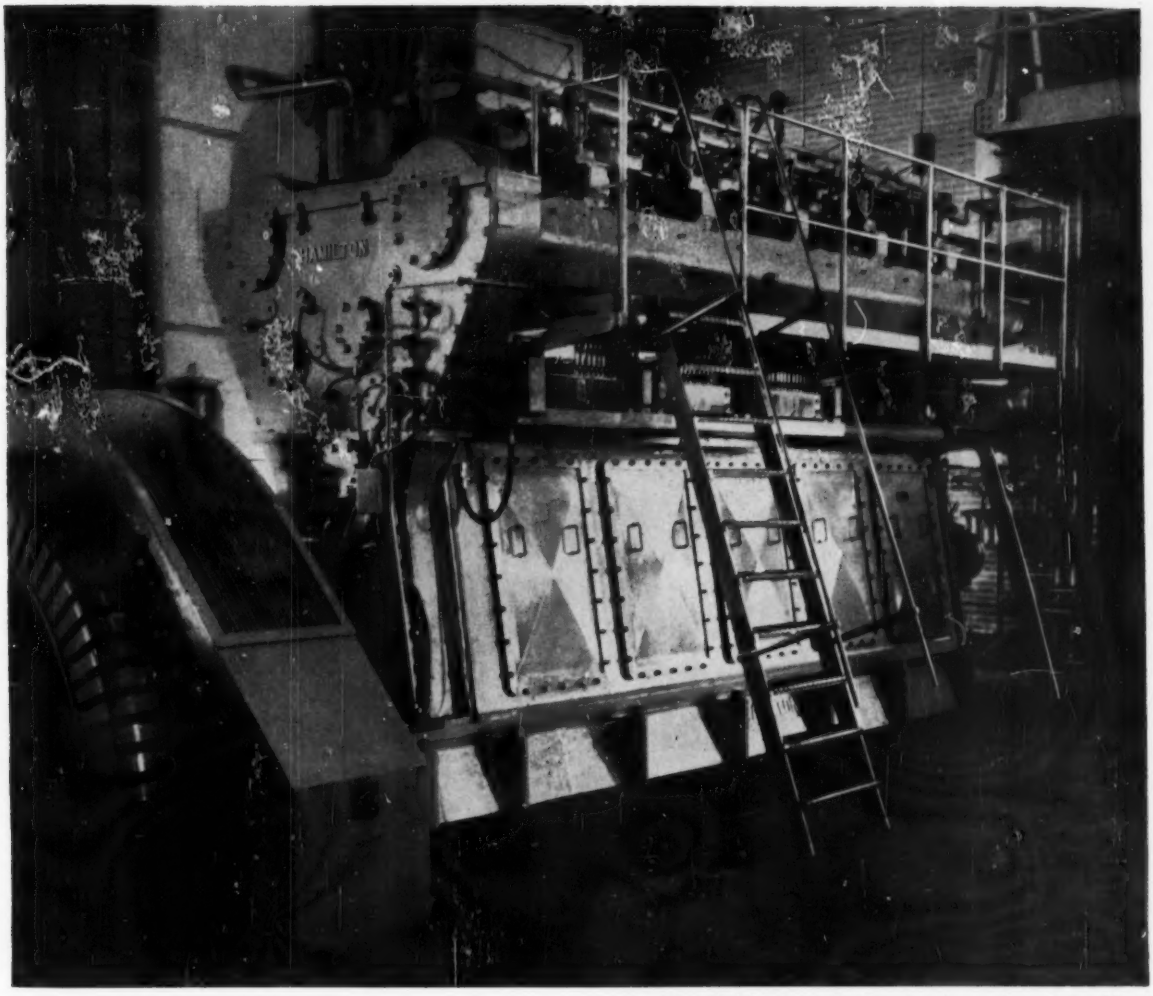
Today's crop of engines are more versatile, both as to performance and application. They run more economically and longer. You can pack more power in less space and with lower weight than ever before. These new capabilities are breaking through the shell of preconceived applications

(*Continued on Page 66*)

A BREAKDOWN OF ENGINES IN USE BY APPLICATIONS

	No. of Engines	Av. H.P. per Eng.
Railroad	60,000	1,200
Highway Transportation	168,000	140
Municipal & Utility	11,000	1,250
General Industry	250,000	300
Petroleum	68,000	300
Mining	45,000	150
Construction	418,000	150
Agriculture	450,000	75
*Marine	79,000	300
	1,549,000	
	(+500,000 misc. engines)	

*The marine field is covered by our companion publication RIVERS & HARBORS.



Hamilton Model 521 SA diesel engine shown above is capable of burning the heaviest bunker oil with absolutely clean exhaust.

Pay for a quarter-million-dollar diesel unit with fuel savings alone!

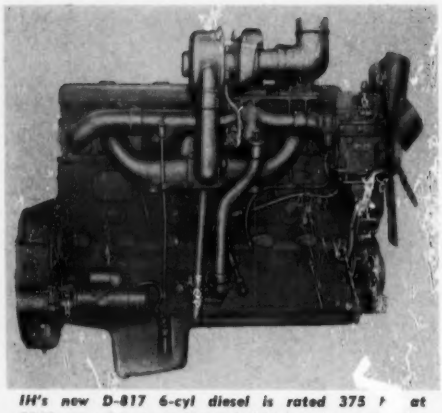
That's what the City of Edmundston, New Brunswick, Canada, will do in 6 short years in operating its new 8,815,000 kwhr per year generator. The reason is the fuel-burning efficiency of its Hamilton-made Diesel 521 SA engine. Because of its unique Hamilton-designed rotary exhaust valve system, this engine is capable of operating on bunker-C residual fuel at only 11.6c per gallon—as compared with 18.6c for distillate fuels required with ordinary diesels.

Last year this Hamilton Diesel-powered generator effected operating fuel cost savings of $44,000. And further savings are expected following installation now under way of a hot water heat exchanger in the engine exhaust. Eventual cost per kwhr is expected to be as low as 6.5 mills. Light fuel is employed only while starting, and for about 20 minutes before shutting down to flush fuel lines and injectors. Heavy residual oil is used for all other normal operations. Write today for complete details on how Hamilton's Model 521 SA Diesel can bring you substantial savings.

Hamilton Division Hamilton, Ohio

BALDWIN · LIMA · HAMILTON

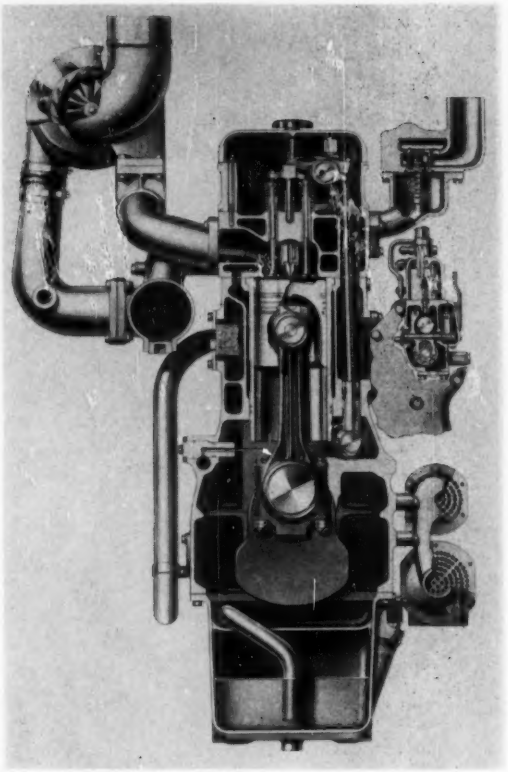
Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools



IH's new D-817 6-cyl diesel is rated 375 hp at 2100 rpm when turbocharged, 250 hp when naturally-aspirated. It is 55.50-in. high, 39.36-in. wide and 61.150-in. long with suction fan. When equipped with blower fan the engine is 61.380-in. long.

IH's D-817 Engine— Its Most Powerful

Through use of a new combustion chamber design, a new fuel injection system and liberal use of aluminum parts, high output with good fuel economy has been obtained with a low weight-to-power ratio.



Open-type combustion chamber has a symmetrical design. Air swirl is added by using an offset counterbore feature on the two intake valves. Twin-plunger fuel injection pump at right has two-port and metering-helix pumping assemblies and timed distributor valves. Mechanically-operated injectors are used. Schwitzer turbocharger is seen at upper left.

INTERNATIONAL Harvester's new D-817 4-cycle diesel is now in production. This 817-cu in. displacement engine is a heavy-duty, high-speed, direct-start unit designed for high output. It is suitable for powering generator sets (especially emergency automatic stand-by units), shovels, crushers, boats, off-highway and on-highway vehicles and other applications requiring heavy-duty, high-output power.

Many features, some new, some already field-proven in previous IH designs, make this 6-cyl D-817 a rugged high-output engine. It is rated 375 intermittent hp at 2100 rpm when turbocharged and 250 hp at 2100 rpm when naturally-aspirated. Its bore is 5⅜-in. and its stroke is 6-in. A weight of 3500 lb figures to 9 lb per hp at its highest rating.

Major differences between the naturally-aspirated (NA) and turbocharged (T) engine are injection timing, valve timing and pistons. Injector timing is 5 deg earlier on the NA engine. Valve overlap is 105 deg between intake opening and exhaust closing on the T engine and 35 deg on the NA unit.

Turbocharged engine compression ratio is 16:1 while that of the naturally-aspirated unit is 16.5:1.

The D-817 has many new-design parts and systems, two of the most outstanding include the combustion chamber design and the new IH fuel injection system.

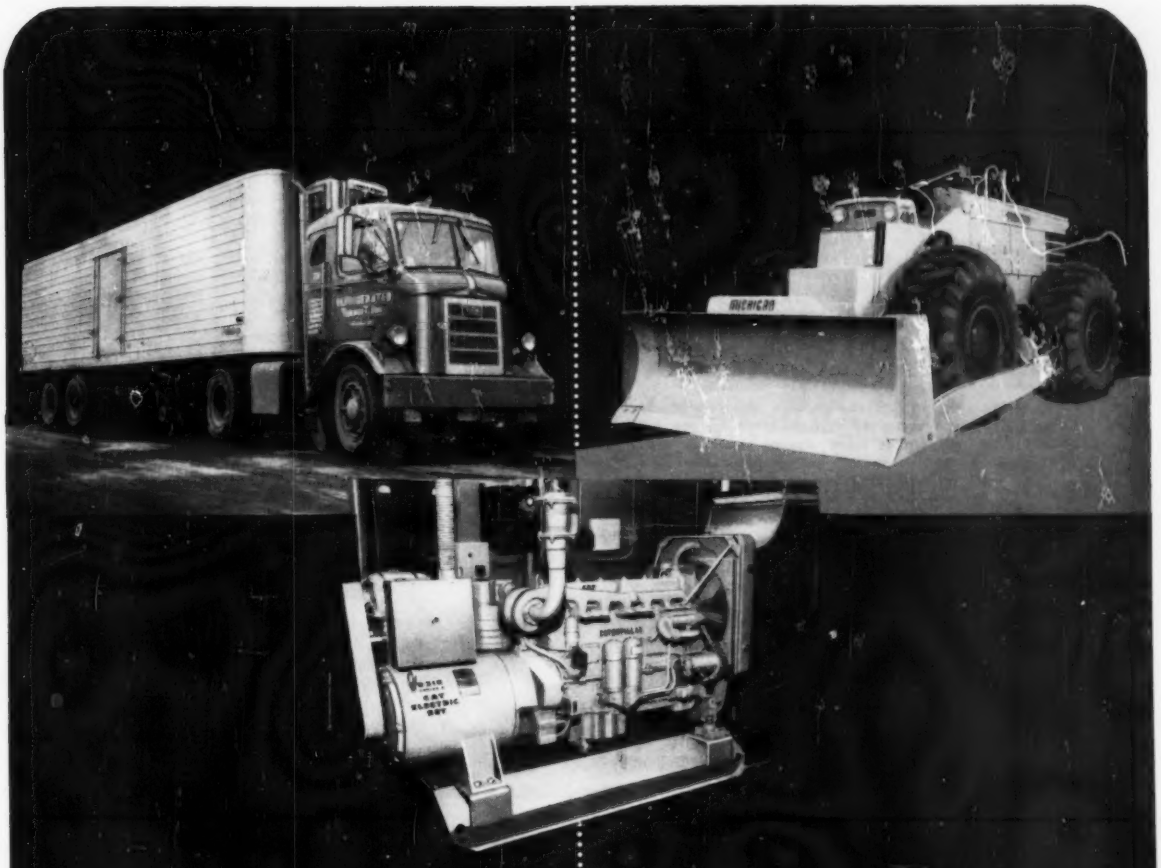
Combustion Chamber Design—

The open-type combustion chamber used has a symmetrical design. Air swirl is added by using an offset counterbore feature on the intake valves. An initial swirl is started as the valves open, lasts through the compression stroke and results in excellent mixing of fuel and air. This effect is much more evident on the NA then the T engine, particularly at lower speeds.

The open combustion chamber design permits direct, 24-v, electric starting down to 30°F without use of starting aids and to -26°F with ether starting aids.

This combustion chamber design with its brand new, tailored fuel injection system gives good fuel economy down to 0.380 lb per bhp hr and excellent torque characteristics.

(*Continued on Page* 32)

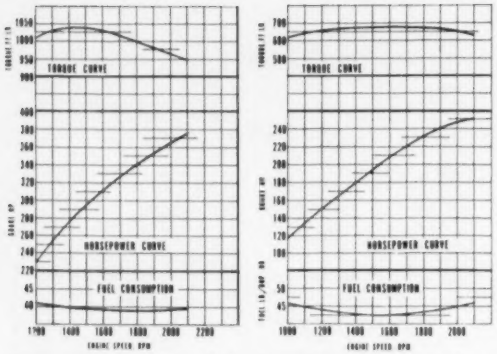


You find Schwitzer Turbos where the world's work is done

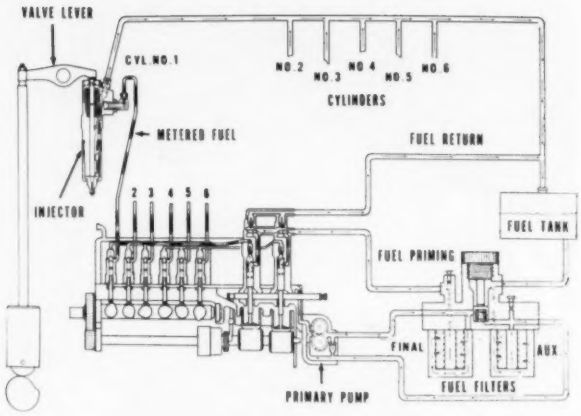
SCHWITZER
CORPORATION
INDIANAPOLIS, INDIANA

PRODUCTS WITH A NEW APPROACH

- Turbochargers
- Superchargers
- Fan Blades
- Fan Drives
- Accessory Drives
- Vibration Dampers
- Air Starting Motors
- Water Pumps
- Oil Pumps
- Shaft Seals



Torque, horsepower and fuel consumption curves for turbocharged D-817 diesel are given at left. Those for the naturally-aspirated unit are at right. Use of open-type combustion chamber with matched IH fuel injection system gives good fuel economy and excellent torque characteristics.



FUEL SYSTEM

(*Continued from Page* 30)

Fuel System

The fuel system diagram gives details of fuel flow. Fuel is supplied to an IH twin-plunger pump at 35 to 65 psi. This twin-plunger pump has two port and metering-helix pumping assemblies and timed distributor valves. It meters and distributes fuel at low pressure (1000-1500 psi) to a mechanically-operated injector at each cylinder.

A screen in the injector fitting prevents dirt from entering injector passages. A flat check valve in the injector inlet passage opens at about 175 psi. The inlet port through which fuel passes into the chamber under the injector plunger is closed off as the injector plunger descends. Prior to closing of this port by the plunger, the flat check valve prevents fuel from backing up in the inlet passages. Metering starts at 140° BTDC and duration is determined by the fuel requirements of the engines.

Metered fuel is stored in the injector until forced into the cylinder by the injector. Actually this is an air-fuel mixture because the chamber size under the plunger exceeds maximum fuel volume. At the proper time, the cam-operated injector plunger moves down forcing fuel into the cylinder through a multiple-orifice tip. This tip has seven 0.007-in. holes with 160 deg included spray angle. Peak fuel injection pressure at full load is 20,000 psi.

The injection pump rotates counter-clockwise when viewed from the drive end. It is opposite to direction of rotation of other production engines. This requires a different primary pump with a pressure-regulating valve set-up, and inlet and outlet locations reversed. No reverse check valve is needed because of the low metering pressure.

Fuel filters are standard production units. A filter header with hang-down type set-up prevents dirt from entering system when changing filter elements. This also reduces overhead clearance required for changing elements. For installations where fuel filters are above the fuel tank, a priming system is built into the fuel filter header.

Turbocharger

A Schwitzer 4-in.—650 model turbocharger with a 2.4 pressure ratio is used. At 375 bhp, turbine speed at sea level is 70,000 to 80,000 rpm. The compressor is of the open type and has a diffuser-type housing. The turbocharger is oil-lubricated from the engine auxiliary oil gallery.

Block Design

The block contains six wet sleeves. A separate barrel around each sleeve provides high-velocity, high-turbulent water flow resulting in a good scrubbing action around the sleeve.

The block is internally ribbed to give the extra strength and rigidity required for long life operation under heavy power demands. This heavy ribbing plus thick webs for each of seven main bearings eliminate cylinder distortion and provide excellent mounting for the crankshaft.

Crankshaft, Bearings and Camshaft

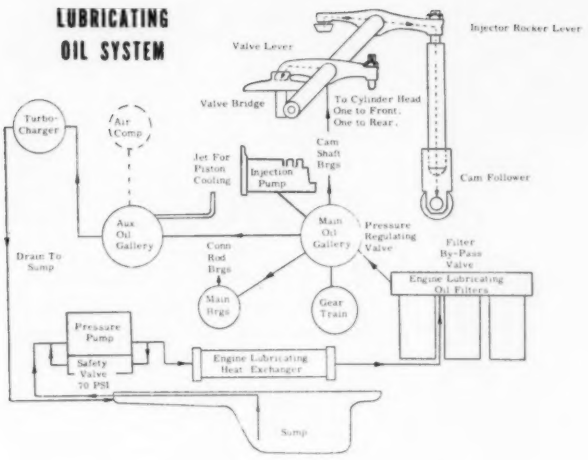
Seven main bearings are used on a fully-balanced, Tocco-hardened crankshaft. The rear main bearing is the thrust bearing.

Main bearings are trimetal type with steel backing. Bearing material is copper-lead with an overlay of tin and flash plate. Main bearing caps are held in place with two capscrews and located by two dowel pins per cap. The caps are made of nodular cast iron for maximum strength with minimum weight.

Conrod bearings are also of the trimetal type with steel backing. Conrod bushings are cast bronze on steel backing.

The camshaft also has seven bearings with thrust being taken on the front bearing. Bearings have steel shells solid or split, with babbitt bearing material.

The camshaft has three lobes per cylinder, one each for exhaust and intake valves and one for the injector. It is driven directly from the crankshaft.



Pistons

Aluminum alloy pistons with Ni-Resist top ring inserts are used. Each has three compression rings and one oil control ring. Under-surface of the piston crowns are jet-cooled by lube oil.

Cylinder Head

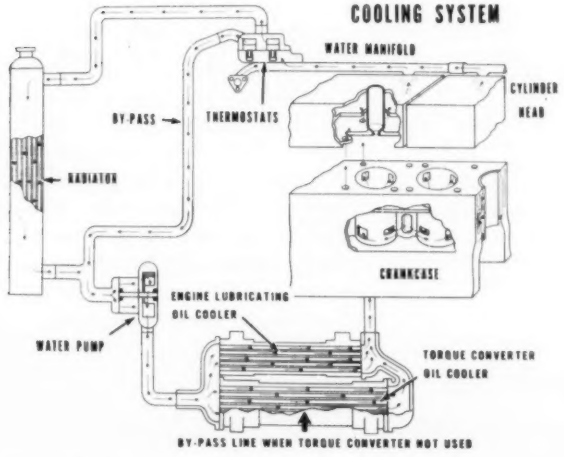
Two cylinder heads are used, each covering three cylinders. The two intake and two exhaust valves are transversely located and each pair is actuated by a rocker arm and guided bridge. Bridges have an adjustment at one end to insure even contact with both valves.

Thompson positive-type rotators are used on all intake and exhaust valves to promote long life. Intake and exhaust ports are on the same side of the engine.

Stellite exhaust valves seats and inserts in the head prevent excessive wear and pitting of the valve seats.

An aluminum fence is bolted to the cylinder head. This provides protection for the head mechanism and retains lube oil. Neoprene seals are inserted in the top and bottom of the fence to prevent leakage. An aluminum valve cover completes the enclosure.

A water-cooled copper injector sleeve is inserted in the head and rolled at the top and bottom for sealing.



Gear Train

There are nine gears in the gear train. This includes the fan and hydraulic pump gears.

The gear train is split so that the total load is not carried through the entire train. A side-mounted hydraulic pump is driven through an idler by the crankshaft gear. The camshaft gear is also driven by the crankshaft gear. A fan gear is driven through an idler from the camshaft. The injection pump gear is driven through a pinion and a drive gear, also from the camshaft. Two oil jets lubricate all these gears.

Lubricating Oil System

Details of the lube oil system are seen in the flow diagram. The gear pump is located on the left side of the engine. A safety valve at the pump prevents excessive pressure build-up in case of blockage after the pump.

The pressure regulating valve in the main gallery maintains an operating pressure of 40 to 45 psi. Excessive oil is returned to the pump through a spill port.

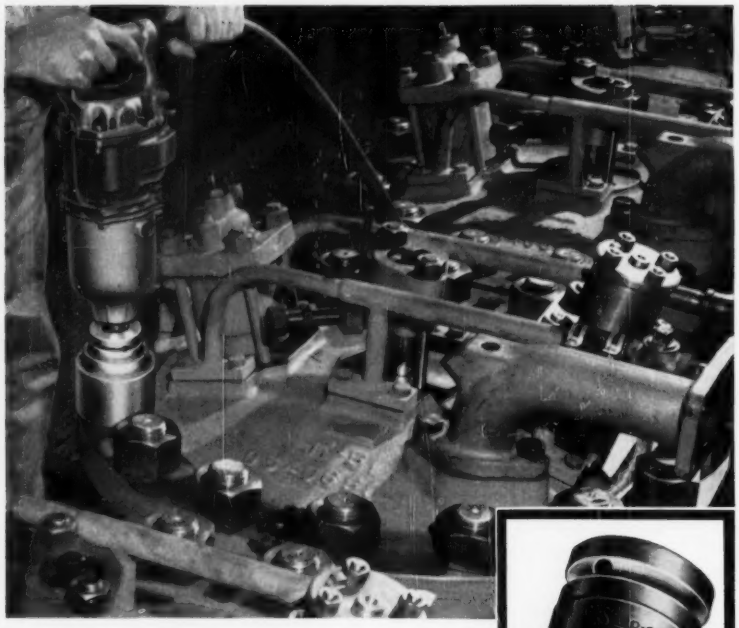
The auxiliary gallery provides oil for piston cooling jets. Each piston is sprayed with 1½ gal of oil per minute. This is a continuous flow of oil, decreasing slightly only at lower engine speeds.

The piston pin bushing in the conrod is gravity-lubricated by means of a collector cup in the top of the conrod. This collects oil from the piston cooling spray and feeds it through a drilled passage to the bushing.

A scavenging pump is sometimes used adjacent to the pressure pump. In angle operation up to 45 deg it delivers oil to the sump so it is available for the pressure pump. There is no need for it on power units and highway truck engines.

The oil pan is reversible so it can be adapted to various applications or requirements, clearance wise.

The lube oil cooler is standard on both NA and T engines. Full-flow lube oil filtration is used, using three elements in parallel. Filters are of



Tips to help you cut impact socket breakage

- Position power wrench so that socket fits straight on nut. Tilted wrench causes binding and socket breakage.
- Use right size socket . . . replace worn or undersize nuts. Loose-fitting sockets wear faster — then break.
- Don't keep impacting after nut is tightly set. This causes needless wear on both wrench and socket.
- Keep the inside of sockets clean. Dirt and grease are common causes of socket breakage.
- When power wrench drive head becomes worn — replace it. Loose drive causes excess wear in socket drive opening — early socket breakage.

Best tip yet!

ALWAYS USE *Snap-on* INDUSTRIAL SOCKETS

Sockets used on power nut runners and impact wrenches take a terrific pounding. Standard hand-wrench sockets are not designed for this work. *Snap-on* heavy-duty industrial sockets have the extra heft and toughness to take the beating. Result: more work-hours per socket and, equally important, less costly downtime resulting from frequent breakage of ordinary sockets.

Final tip. Talk sockets with your *Snap-on* man. Take advantage of his specialized tool knowledge, and his competent advice on what is best for you in the wide range of *Snap-on* industrial sockets. Your nearby *Snap-on* branch office provides prompt emergency or regular service.

Snap-on Tools FOR ALL INDUSTRY

SNAP-ON TOOLS CORPORATION

8064-A 28th Avenue • Kenosha, Wisconsin

the hang-down type, with plastic impregnated paper elements.

Water System

Water flow is detailed in the cooling system diagram. The two entrance ports at the lower end of each sleeve are readily seen. The main port supplies the maximum tangential water flow to the sleeve. This creates a swirl almost all the way around the sleeve. The smaller port provides enough additional swirl to surround the cylinder sleeve with high velocity flow and good scrubbing action.

Water entering the cylinder head at four points, 90-deg apart, is forced by a baffle toward the center of the cylinder. It flows up past the copper injector sleeve and spreads out to cool the port walls, valve guide bosses, etc.

Two Detroit Vernatherm thermostats with a 160-195°F range are used. During warm-up, all water bypasses the radiator. At maximum temperature the by-pass is closed and all water passes through the radiator. Water flow is about 140 gpm at 2100 gpm engine speed.

The water pump is mounted on a common shaft with the lube oil pump and runs at 1.250 times engine speed.

Summary

The D817, with its 375 hp rating when turbocharged will be the highest output diesel made by IH. It gives them a unit in an output range popular for the construction, industrial and off-highway applications where there is a large demand.

Through use of aluminum parts, and turbocharging, high output has been accomplished with a ratio of only 9 lb per hp. A light-weight, compact, heavy-duty unit meeting the rugged requirements of the above mentioned applications is the result.

Use of an open-type combustion chamber with a matched IH fuel system gives good fuel economy and excellent torque characteristics.

All these factors plus others previously mentioned make this model a valuable addition to IH's family of high-performance engines.

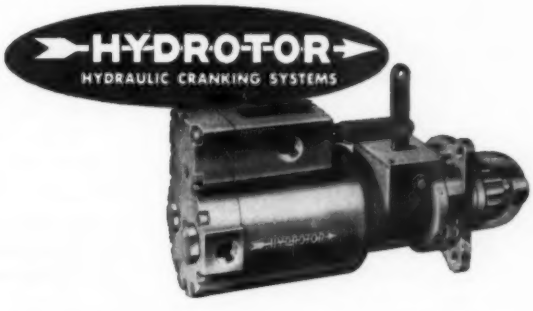
. . . and the starting is rugged!

Expensive, too. When freezing weather strikes, countless man hours, machine hours and profits may be squandered before your equipment gets going.

BUT . . . for a fraction of the money you're now losing on cold weather starting, you can equip your engines with ***AMERICAN BOSCH*** Hydrotor hydraulic cranking systems that spin engines lightning fast even in sub-zero weather. The minute the day's work starts — every piece of equipment can be running and ready for action — with Hydrotor.

Hydrotor cranking power is always available—even after months of idleness. And for major savings . . . Hydrotor systems operate without batteries to spare you the incessant expenses of battery maintenance and replacement.

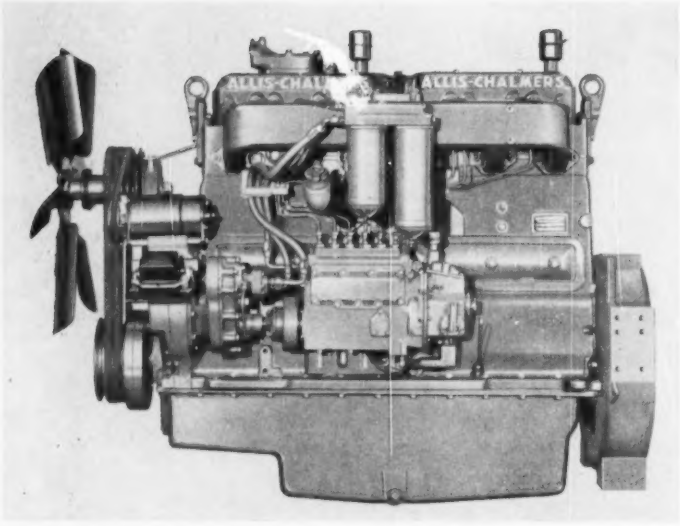
Learn more about Hydrotor—the revolutionary system that uses oil under pressure to crank engines faster with greater power. Send today for free brochure H 110-02-2 and the name of your nearest Hydrotor distributor. ***AMERICAN BOSCH*** Division, American Bosch Arma Corporation, Springfield, Massachusetts.



For construction, trucking, marine, logging, oil field equipment

6427

AMERICAN BOSCH ARMA CORPORATION



Naturally-aspirated Series 16000 engine is identical to 21000 model except for turbocharging. Parts are interchangeable.

A-C's 16000 and 21000 Engines

New features including a brand new combustion system give new performance and very low fuel rates. Thoroughly field-tested, they are now in production.

"ALL-new" performance characterizes a new Allis-Chalmers engine series. Over seven and a half years of concentrated design, development and testing culminated in the introduction of these new models—the A-C 16,000 and 21,000 engines. They feature high performance with low fuel rates.

Both engines are identical with all parts interchangable, the difference being that the 21,000 model is turbocharged. They are 6-cyl, 4-cycle, in-line units. Bore is 5¼ in.; stroke, 6½ in.; displacement, 844 cu in. Rated horsepower of the 16,000 and 21,000 models at 2000 rpm are 230 and 340 respectively.

Performance characteristics, rather than any radical departure from the basically simple and rugged construction typical of its predecessors, substantiate the "all-new" designation. Quick, easy starting even in cold weather, fast acceleration, and a clear exhaust throughout the speed and power range are some of its features. The fuel rates shown in the performance chart speak for themselves. Specific weights at the top rating are in the order of 9 lb per bhp. How was this performance achieved?

Combustion System the Key

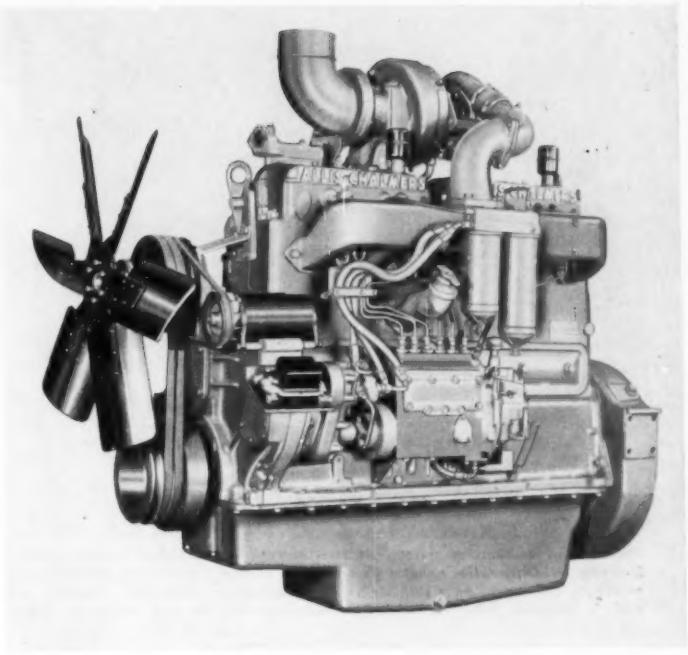
Design emphasis was placed on the combustion system. It was to be an open-chamber type. The main objective was to get the maximum number of fuel molecules into "collision" with the available oxygen molecules in the air charge. This meant that a high degree of turbulence was needed. This is the concept around which the combustion chamber was designed. Here's what evolved.

The power crater combustion chamber is contained in the piston and is toroidal in shape. The power crater occupies the small center position of the flat piston top. Controlled turbulence for good mixing of fuel and air is obtained through both swirl and squish.

Good swirl is obtained by the design of the air induction system. Two intake valves are used to provide easy breathing. Their combined area is 30% greater than that of the single exhaust valve. In addition to the directional flow resulting from porting design, each intake valve is masked to impart a positive directional swirl.

Squish results from piston and cylinder head design. Since the combustion chamber is concentrated in the center of the piston, a large portion of the piston crown is a flat annular area. The cylinder head is essentially flat. Piston-to-head clearance is held to the absolute minimum that is practical. Thus, as the piston approaches top dead center, air is squished inward at increasing velocity and imparts a third dimension to the turbulence in the combustion chamber. Fuel is injected into this violently turbulent air.

The fuel injection nozzle is centrally located. Nozzle holes are all 0.014-in. in diameter, a 4-hole nozzle being used in the normally-aspirated engine and a 5-hole tip used in the turbocharged version. Orifices are large



Series 21000 model with top-mounted turbocharger. The 6-cyl, 844-cu in. engine is rated 340 hp at 2000 rpm.

enough to avoid many problems associated with smaller nozzle holes.

With this diameter hole, fuel jets penetrate this turbulent air mass, some fringe spray peeling off along the entire length of the jets to vaporize and start the combustion process. After initiation of combustion by the fringe particles, the remaining fuel is conditioned to continue smooth burning, resulting in a controlled pressure rise.

This combustion system is the key to the performance achieved—particularly the low fuel consumption rate.

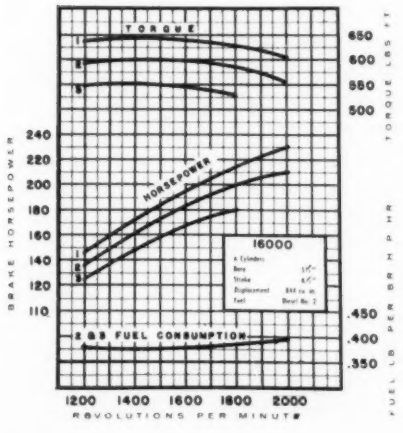
Engine Structure

Structurally, design emphasis was placed on simplicity, ruggedness and ease of servicing. The engines are "beefy" without being "heavy". They are strong where they need to be to keep stresses low in critical sections. An example is seen in the block design. Cylinder head studs are threaded into holes, counterbored a half-inch or so below the face of the block. This lowers the stresses from the studs below the top deck and helps eliminate distortion of this face that must mate with the head. The block is internally ribbed to carry stud tension through the entire depth of the block.

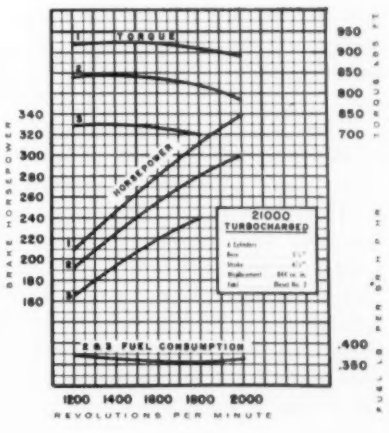
A rigid, fully counter-balanced crankshaft hangs in aluminum bearings. Connecting rods with a new section are used. They are stronger than previous designs without having any additional weight. A 5-ring aluminum piston with a Ni-Resist top ring groove insert is used. There are three compression rings and two oil rings, one being below the piston pin. The piston pin is full-floating and is retained by spring clips. Wet liners are used.

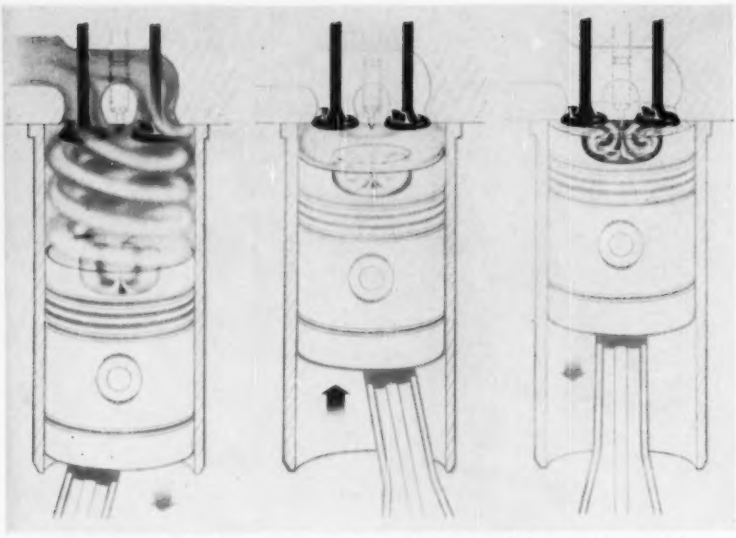
The camshaft is low on one side of the block and is driven by a gear from the crankshaft. Cams function through light-weight flat tappets, pushrods and rocker arms to operate the valves. Three valves per cylinder, two intake and one exhaust, have removable guides and seat on inserts in the fairly deep, rigid cylinder head.

Each pair of intake valves is operated by a rocker arm bearing on a bridge. This bridge is guided. An adjustment is provided at one end to insure equal contact with both valves in case there is a slight variation in



Standard bare engine curves for 16000 Series engine at left and 21000 model at right are corrected to 29.92-in. of mercury and 60°F temperature. Note low fuel consumption curves on both engines and excellent torque performance.





Operation of combustion system. At left, masked valves induce positive swirl in incoming air. Center, flat annular piston area is adding a third-dimensional "squish" effect to the swirl. At right, air is concentrated in combustion chamber and fuel is injected into the violently turbulant air to get excellent mixing.

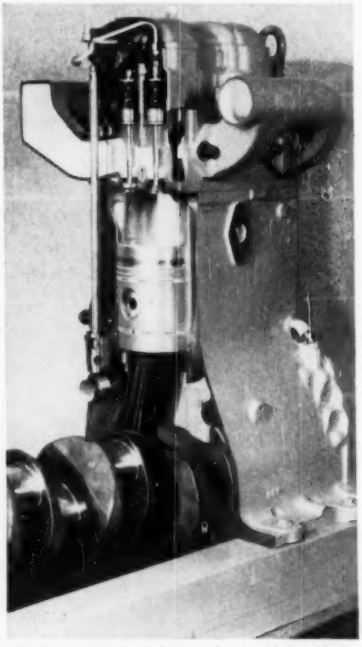
stem length or that one valve seats deeper than the other as might be the case after reconditioning. To insure proper mask position, the intake valves are restrained from turning. A projection on the lower valve spring seat extends into a keyway cut in the valve stem. Each valve has double springs with opposite helices both to hold the inner spring in position and to equalize spring torque.

Other Engine Systems

Injection System—Arrangement of the fuel transfer pump and injection pump drive is shown. The injection pump is an APE-type base-mounted American Bosch unit, with an integral variable-speed governor. Fuel filters are also shown. A high-pressure fuel line and a leak-off line are connected to the nozzle through connector passages in the lower valve cover.

Turbocharging System—The exhaust manifold is split with the first three cylinders connected to one turbo inlet, the back three connected to the other. A flexible expansion joint is provided in each manifold branch. This eliminates expansion strains on the turbo. An AiResearch turbocharger is used. Lubrication is supplied by the engine through a separate filter. The unit is air cooled.

Lubricating System—Oil in the full-pressure lubricating system is both filtered and cooled. Duplex full-flow filters "hang" from an engine-mounted casting. The oil cooler is also an integral part of this conditioning system. Water is piped from the engine block to the cooler and then to circulating pump suction. The assembly is complete, compact and readily accessible for servicing.



Dual masked inlet valves with their bridge and actuating mechanism. Note ample water jacketing of liner and head.

Field Tests

Initial field tests of these new engines were started several years ago in earthmoving equipment operating under the most severe conditions. According to Burt Clark, A-C engine products manager, operators of these test engines enthusiastically confirm achievement of the performance features for which the engines were designed. In view of the severity of the test conditions and satisfaction with the performance, the engines are now considered ready for application in a wide range of services. It should be hard to find one tougher than the earthmoving tests. Other applications visualized include: off-highway vehicle use, as power units, generating units, marine propulsion and auxiliary units, and miscellaneous industrial uses.

Other Happenings At A-C

At the Harvey, Illinois, plant of Allis-Chalmers many innovations are taking place under the guidance of general manager O. J. Higgins and his executive staff including A. F. Ochtman, director of engineering; C. M. Guerasimoff, chief engineer; and Hans Wittek, director of research. A new department has been set up to manufacture precision fuel injection parts for the former DEMCO line which A-C acquired a year or so ago.

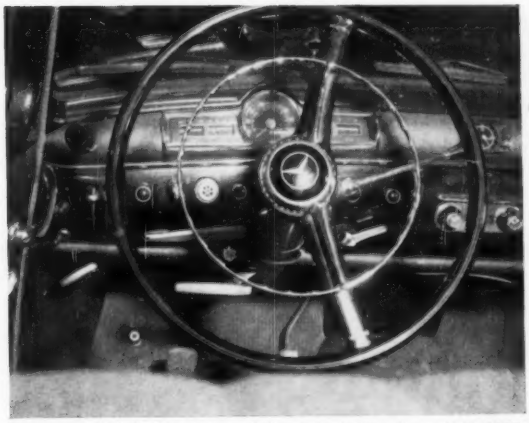
An entirely new engineering center has been constructed and is now being equipped for design, research and development. The test unit, still in the outfitting stage, will house 22 test cells providing facilities for basic research and development projects, testing power units and accessories and making endurance runs. Each test unit has automatically-modulated ventilation to maintain the ambient temperature at 90°F, the temperature used for their testing. This facility is a $3,250,000 project, housing over 13,000 square feet of floor space to be ready for full-scale operation early in 1959.

Head-on view (left) and three-quarter view (above) of Mercedes-Benz 180D gives impression of broad-shouldered midget. But don't let it fool you, car is not small. It has four-door convenience, seats five people comfortably and gives smooth, non-tiring ride even when traveling for hours for hundreds of miles.

Driving A Diesel Car

By Brian P. Emerson
Editor, DIESEL POWER

Here's what it's like to drive a diesel-powered car. Operation, performance and economics are discussed in detail.



Heater control is at extreme left of dash board on M-B 180D. Starter lever can be seen (at lower right) through the horn ring right next to the steering post. Glow plug indicator is at left of steering post, also seen through the horn ring. The switch for turning on electrical power is located above starter lever.

WHAT'S it like to drive a diesel-powered car? Since we've been talking about diesels for taxicabs and small industrial vehicles, we decided to find out. So we bought one—a Mercedes-Benz 180D.

It wasn't new, in fact, had over 30,000 miles on it. From first-hand reports as well as hearsay, these cars are doing well over 100,000 miles in taxi service abroad before repairs are required. In any case, it appeared to be in excellent condition. Despite this, here was a chance to put into practice some preventive maintenance principles that we have advocated editorially.

First step was a complete inspection. A few minor mechanical irregularities were found and corrected—a loose starter mounting, a misaligned generator, an erratic fuel gauge. The generator charging rate was found excessive so a new regulator was installed.

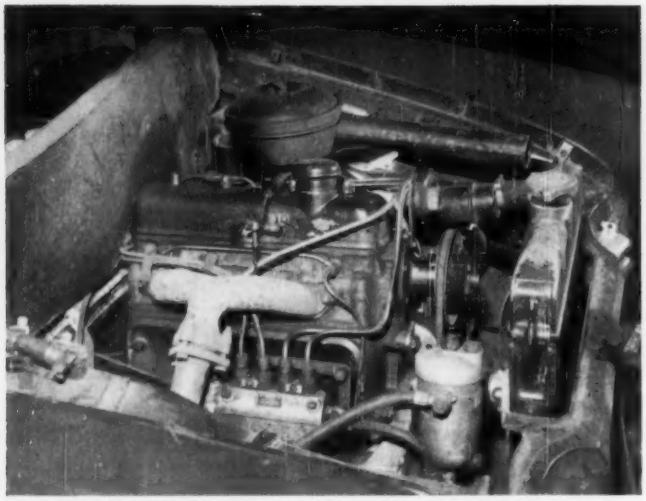
Next came lubrication. To establish a threshold on which to base service periods, everything was checked. Mercedes-Benz provides an excellent manual that details all the servicing points and recommended inspection periods. Oil was changed and the filter element replaced. The fuel oil strainer was cleaned and the final filter element replaced. Every fitting was lubricated. Simple forms were worked out for keeping records and the mileage was entered.

A radio and a side-view mirror were added. Now, we were ready to operate it daily as a personal car.

Driving a Diesel

Stepping from a car with over 200 horsepower and automatic shift into the Mercedes with 43 horsepower net at the flywheel and a 4-speed gearbox needs some transition time. You begin to feel a kinship with truck drivers. The average American car has a horsepower-to-weight ratio of perhaps 1 to 20; the Mercedes' ratio is about 1 to 66; and diesel trucks commonly run from 1 to 130 to 1 to 200 or even lower ratios.

Yet while you're not going to burn any rubber off the



Exhaust side of the 43-hp Mercedes-Benz engine. Part of battery can be seen at extreme left behind sound-deadening insulating wall. Robert Bosch, 4-cyl fuel injection pump is seen under the exhaust manifold. Fuel filter with connecting lines is located at left of radiator.

Engine Specifications

Engine	4-cyl, 4-cycle, M-B Type OM 636 VII
Net HP at Flywheel (3500 rpm)	43
Gross HP (3500 rpm)	46
RPM (max.)	3600
RPM at 62 mph	3220
Bore	2.95-in.
Stroke	3.94-in.
Compression Ratio	19 to 1
Curb Weight	2845 lb

tires in jackrabbit starts, you have all the power you really need. The trick is not to get caught with your rpm's down. You soon learn to shift soon enough and low enough. Of course, this is nothing new to truck drivers—or sports-car drivers either.

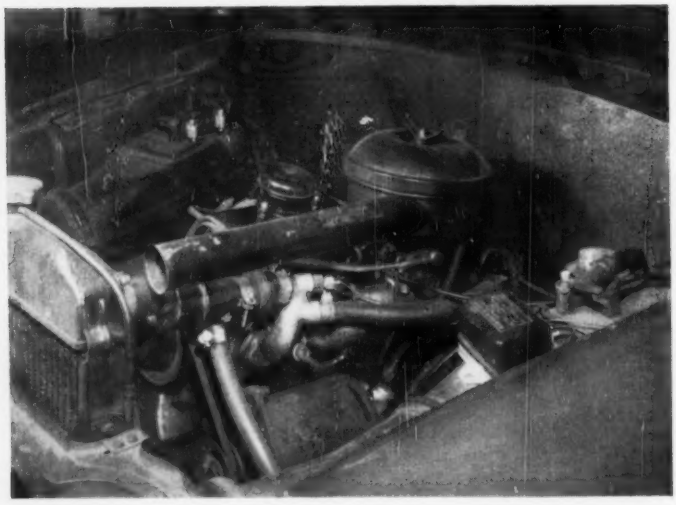
With high horsepower-weight ratios, the tendency when driving with a standard shift is to slip through the gears and get into high as soon as possible. Torques are high enough so that you can get acceptable nimbleness down to 15 to 18 mph in high gear. Not so with 43 horsepower and the limited torque available. Drop below 30 mph in 4th gear and there's nothing left. You soon learn to down-shift. On up-shifting, you learn to run your engine rpm well up in the range for that gear so that road speed is well above the minimum for the next higher gear.

Driving through a governor also takes a little readjustment in driving habits. Engine response to accelerator movement is somewhat different than in a carbureted engine. It takes some practice in coordinating accelerator and clutch for smooth shifting.

While all this may sound like a big deal, it isn't. You get used to the differences and start to get full performance in a short time. In city driving you get all the acceleration that you need. On highways, the car will keep you honest. You can do all the law allows except on some of the unlimited-speed throughways. Top speed is close to 70 mph and it cruises smoothly at 60 to 65 mph. You'll slow up and have to down-shift on bad hills. Yet on a 285-mile run from Portland, Maine, to Stamford, Conn., average

(Continued on Page 45)

Long tube leading into air cleaner takes in air over the radiator. Cooling water thermostat is seen under left end of this long tube. A heater and air vent runs along each side of the 4-cyl diesel.

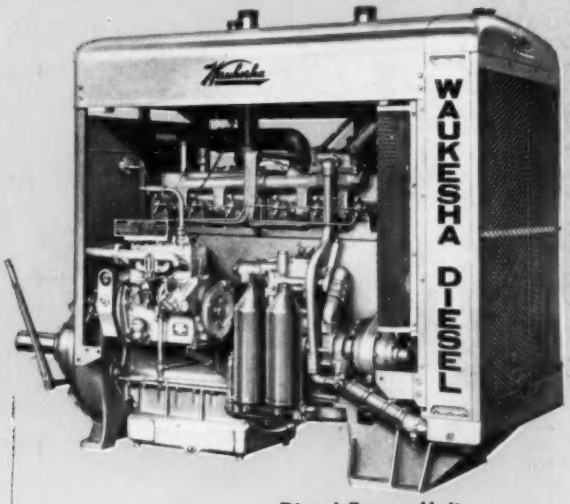


Gear-Shift Data

Gear	1st	2nd	3rd	4th
Mph	17	30	47	70
Grade %	35	19	11	6

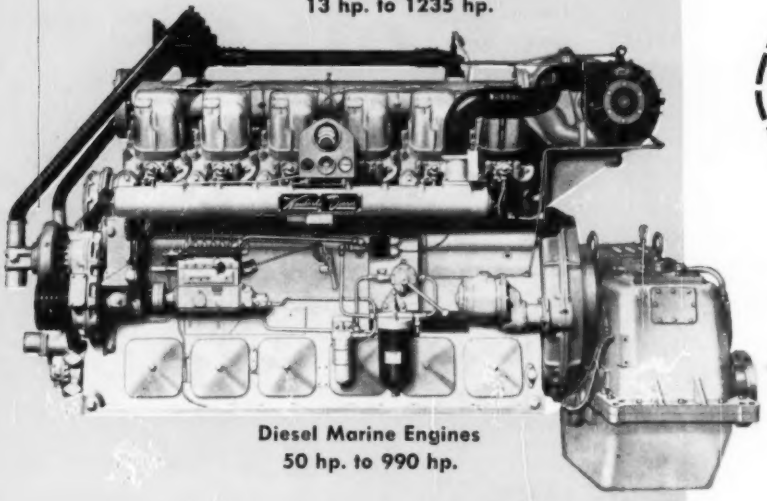
WAUKESHA

Diesels



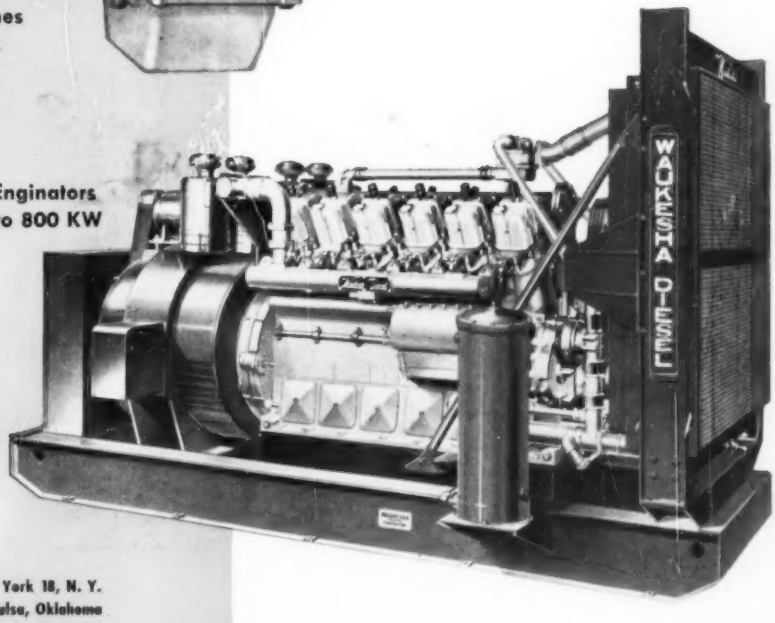
Diesel Power Units
13 hp. to 1235 hp.

13 hp. to 1235 hp.
Normally Aspirated
or Turbocharged



Diesel Marine Engines
50 hp. to 990 hp.

Diesel Enginators
50 KW to 800 KW



WAUKESHA MOTOR COMPANY

WAUKESHA, WISCONSIN

EASTERN SALES OFFICE: Eight West 40th St., New York 18, N. Y.
MID-CONTINENT OFFICE: 5000—S. 45th West Ave., Tulsa, Oklahoma
PACIFIC COAST OFFICE: 4927 Pacific Blvd., Los Angeles 58, Calif.

WAUKESHA Power Ratings

Horsepower ratings and speeds shown herein are subject to change without notice

RATING CONDITIONS—***Engine*** ratings are for standard stripped engines without power-consuming accessories. ***Power Unit*** ratings are for complete units with standard accessories—water pump, manifold, radiator, fan and belt, and air cleaner.

Ratings are corrected to standard 29.92" barometer and 60° F. air temperature. Deduct 3% for each 1000' altitude above sea level and 1% for each 10° above 60° F. except from continuous duty ratings when deduction for altitude is not necessary below 3000 feet.

PERMISSIBLE SPEED—Speeds to left of dividing line are permissible for continuous service; speeds to right of line permissible for intermittent service.

HORSEPOWER—Horsepower shown is maximum. For intermittent duty, the load should not exceed 90% of the power shown. For continuous full load duty, the applied load should not exceed 80% of the power shown.

Ratings and recommended reductions are in accordance with standards of the Internal Combustion Engine Institute of which the Waukesha Motor Company is a founding member.

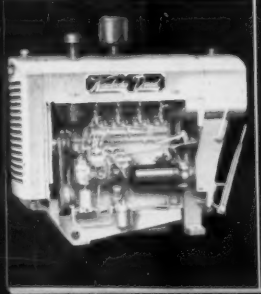
MEDIUM DIESEL ENGINES					800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
MODEL	Features*	Bore & S.	Displ.	Torque–rpm	BRAKE HORSEPOWER AT SPEEDS INDICATED										
180-DLC	4-AC	3½x3¾	144	102-1800	13	18	22	27	31	35	38	42	45		
185-DLC	6-A	3½x3¾	216	152-1000	23	29	34	40	45	50	55	58	60		
190-DLC	6-A	3¾x4	265	191-1400	27	35	43	51	58	65	72	79	84		
190-DLCA	6-AC	3¾x4	265	191-1400	27	35	43	51	58	65	72	79	84	85	84
195-DLC	6-A	4 x4	302	221-1800	30	39	49	58	67	76	84	91	96		
195-DLCA	6-AC	4 x4	302	221-1800	30	39	49	58	67	76	84	91	96	98	98
197-DLC	6-AV	4 x4	302	216-1600	28	38	47	57	66	74	81	85	88	90	91
197-DLCS	6-ATV	4 x4	302	275-1800	...	...	56	70	84	95	105	115	123	128	131
135-DK	6-A	4¼x5	426	328-1600	44	58	73	87	100	113	124	133	140		
135-DKB	6-ACV	4¼x5	426	328-1600	44	58	73	87	100	113	124	133	140	144	147
135-DKBS	6-ACTV	4¼x5	426	400-1800	...	...	87	104	120	137	151	164	173	180	185
148-DK	6-AV	5¼x6	779	584-1000	88	111	132	151	169	184	197				
148-DKB	6-ACV	5¼x6	779	584-1000	88	111	132	151	169	184	197	200-2100			
148-DKBS	6-ACTV	5¼x6	779	706-1800	...	...	150	181	213	242	268	280-2100			
WAKD	6-AV	6¼x6½	1197	840-1000	126	160	189	201-1300	224						
WAKDB	6-ACV	6¼x6½	1197	845-1000	128	161	193	221	244	258	[#6 Turbo to 1200 rpm;				
WAKDBS	6-ACTV	6¼x6½	1197	1400-1200	188	200	320	318	370	400 ...	#7 Turbo 1400-1800 rpm]				
LARGE DIESEL ENGINES					600	700	800	900	1000	1100	1200				
NKDB	6-ACV	7 x8¼	1905	1372-700	156	183	209	234	258	279	297				
NKDBS	6-ACTV	7 x8¼	1905	1732-1000	158	203	245	288	330	363	390				
LRDBC	6-ACV	8½x8½	2894	2170-600	248	284	320	350	376	400	415				
LRDBCS	6-ACTV	8½x8½	2894	3580-800	...	463	545	610	645	681	695				
VLRDB	12-ACV	8½x8½	5788	4330-600	495	572	640	700	750	800	830				
VLRDBS	12-ACTV	8½x8½	5788	5440-1000	560	686	810	930	1035	1135	1235				

Ratings below for complete power units with all standard accessories: water pump; intake and exhaust manifolds, radiator, fan and belt; air cleaner.

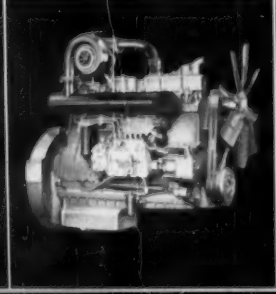
MEDIUM DIESEL POWER UNITS					600	800	1000	1200	1400	1600	1800	2000	2200	2400	
MODEL	Features*	Bore & S.	Displ.	Torque–rpm	BRAKE HORSEPOWER AT SPEEDS INDICATED										
180-DLCU	4-AC	3½x3¾	144	94-1400	...	12	17	21	25	28	31	33	34		
185-DLCU	6-A	3½x3¾	216	147-1000	...	22	28	33	38	42	46	48	50		
190-DLCU	6-A	3¾x4	265	180-1400	...	26	34	40	48	54	60	66	71		75(C)
195-DLCU	6-A	4 x4	302	206-1600	...	29	38	46	55	63	70	76	81		
135-DKU	6-A	4¼x5	426	308-1600	...	42	55	69	82	94	106	115			
135-DKBSU	6-ACTV	4¼x5	426	379-1800	...	...	...	83	99	115	130	143	154		
148-DKU	6-AV	5¼x6	779	551-1000	...	84	105	124	141	155					
148-DKBU	6-ACV	5¼x6	779	551-1000	...	84	105	124	141	155	167	177			
148-DKBSU	6-ACTV	5¼x6	779	660-1800	...	...	...	141	171	200	226	248			
WAKDU	6-AV	6¼x6½	1197	803-1000	...	120	153	180	190-1300	205-1500					
WAKDBU	6-ACV	6¼x6½	1197	803-1000	...	120	153	180	199	209	212	[#6 Turbo to 1200;			
WAKDBSU	6-ACTV	6¼x6½	1197	1360-1200	...	182	193	311	306	352	373...	#7 Turbo 1400-1800]			
LARGE DIESEL POWER UNITS					600	700	800	900	1000	1100	1200				
NKDBU	6-ACV	7 x8¼	1905	1313-700	150	175	200	222	243	258	268				
NKDBSU	6-ACTV	7 x8¼	1905	1650-1000	152	196	236	276	314	342	361				
LRDBCU	6-ACV	8½x8½	2894	2100-600	240	275	310	338	361	381	390				
LRDBCSU	6-ACTV	8½x8½	2894	3500-800	...	453	533	594	623	651	655				
VLRDBU	12-ACV	8½x8½	5788	4245-600	485	560	625	681	727	773	797				
VLRDBSU	12-ACTV	8½x8½	5788	5300-900	549	672	793	909	1008	1101	1191				

***FEATURES:** 4, 6, 12—No. Cylinders; **A**—Aluminum Pistons; **C**—Counterbalanced; **T**—Turbocharged; **V**—Vibration Dampener.

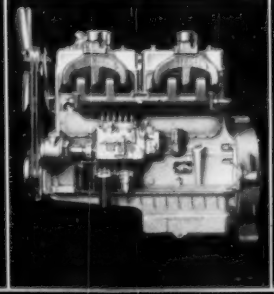
4-cyl. Utility Unit (180-DLCU) 144 cu. in. displ.



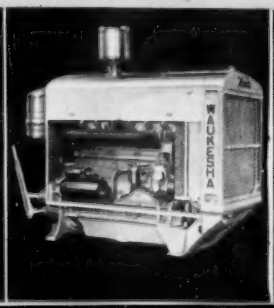
Medium 6 Turbocharged Engine (148-DKBS) 779 cu. in. displ.



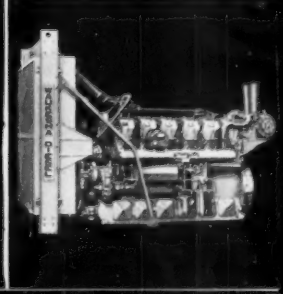
Medium 6 Non-turbo Engine (WAKDB) 1197 cu. in. displ.



Small 6 Non-turbo Unit (135-DKU) 426 cu. in. displ.

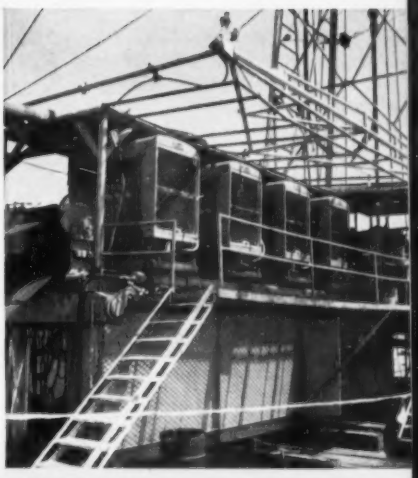


Big V-12 Turbocharged Unit (VLRDBSU) 5788 cu. in. displ.



OIL FIELD DIESELS
13 to 1235 hp.

In the oil fields of the world—for drilling, pumping, compressors, pipeline, or utility use—onshore or offshore, Waukesha means dependable, full-rated power. The development of these smooth, versatile oil field units is backed by over 50 years of study and experience in building heavy duty industrial-type internal combustion engines. Outstanding characteristics are lively acceleration, clean burning, prompt starting, a tremendous reserve of power and great overall economy.



CONSTRUCTION DIESELS
25 to 1235 hp.

All the proven features that ensure long life and the ability to withstand overloads are built into these Diesels. Crankshafts are precision balanced, rugged, and have large bearing surfaces; valve and camshaft mechanisms are carefully engineered; pistons, rings and rod assemblies are installed in matched sets; crankcases and structural elements ribbed and flanged for extra strength; combustion chambers and manifolding are a result of constant research development . . . all engineered to famous Waukesha Quality Control standards.

MARINE DIESELS
50 to 990 hp.

EASY STARTING • SAFETY • SIMPLICITY
SMOOTHNESS • ECONOMY

Six models, normal or Turbocharged

RELIANCE	—12 cyls., 5788 cu. in. displ., 990 max. hp.
DEFENDER	— 6 cyls., 2894 cu. in. displ., 510 max. hp.
WANDERER	— 6 cyls., 1905 cu. in. displ., 315 max. hp.
RESOLUTE	— 6 cyls., 1197 cu. in. displ., 290 max. hp.
VIGILANT	— 6 cyls., 779 cu. in. displ., 195 max. hp.
CUTWATER	— 6 cyls., 426 cu. in. displ., 120 max. hp.

These are maximum ratings for 24-hour duty service.

TRANSPORT DIESELS
30 to 400 hp.

From the complete line of Waukesha transport Diesels you can select exactly the right size and power range to fit your requirements—up to 400 turbocharged horsepower at 1800 rpm in the 6¼" bore and 6½" stroke, 1197 cu. in. model **WAKDBS**. Smaller sizes available with speeds up to 2800 rpm. Overhead valves, aluminum pistons, replaceable sleeves—all the modern features that give hundreds of thousands of miles of economical, reliable transportation.

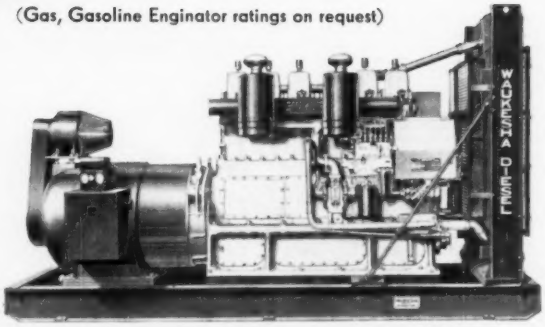
ENGINATORS
50 to 800 KW

Table shows *continuous* capacity ratings—
Waukesha Diesel Enginators—50 and 60 cycle.—

Enginator Series	60 Cycle Operating Speeds, RPM					50 Cycle Operating Speeds, RPM			
	600	720	900	1200	1800	600	750	1000	1500
135	NA	NA	NA	NA 50*	60 75*	NA	NA	NA	50 62*
148	NA	NA	50 NA*	70 100*	95 150*	NA	NA	55 80*	80 125*
WAKD	NA	NA	75 120*	100 170*	120† 205*†	NA	NA	85 135*	115 185*
NKD	80 105*	100 125*	125 150*	150 205*	NA	80 105*	105 130*	135 175*	NA
LRD	135 200*	155 245*	185 310*	235† 365*†	NA	135 200*	165 255*	200 350*	NA
VLRD	270 350*	320 410*	385 515*	450† 675*†	NA	270 350*	330 430*	410* 575*	NA

NA = NOT AVAILABLE. Ratings are maximum KW for continuous duty at sea level at speeds indicated. Upper KW figure is for naturally aspirated. Lower figure marked * is for Turbocharged engines. Above ratings are for radiator cooled fan units. Higher ratings permissible with heat exchanger cooling. Higher ratings available for intermittent and stand-by service. † Consult Waukesha Motor Company, stating specific application details.

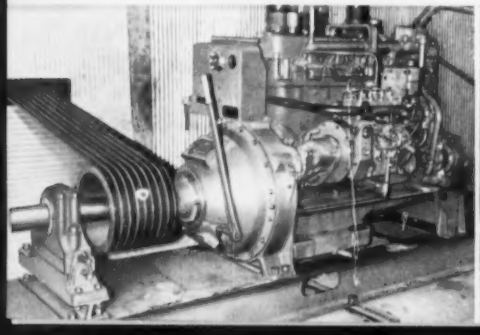
(Gas, Gasoline Enginator ratings on request)

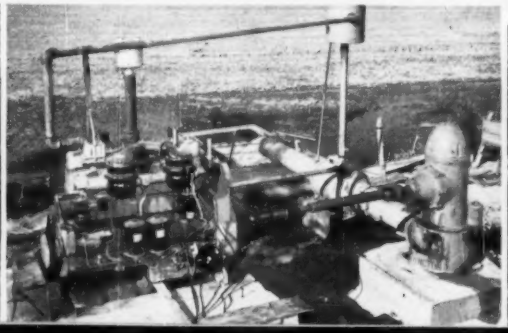


Typical Waukesha Diesel Enginator—Model LRDB. All Enginators available with electrical characteristics, controls, and instrumentation for conventional or special service.

COTTON GINNING • IRRIGATION • LOGGING
Up to 1200 max. hp.

Momentary overloads will not stall these engines; high torque throughout the speed range enables them to pull through, and quick governor response to load variations makes operation virtually automatic. The wide range of horsepower meets the requirements for "something more powerful" with ample reserve for auxiliaries, and permits accurately balanced engine and driven machinery combinations in all applications requiring a smooth, steady flow of power for continuous or intermittent duty





(*Continued from Page* 40)

speed was just over 54 mph while staying within all the posted speed limits.

The Car Itself

Unitized construction keeps the car free from rattles and squeaks. A horseshoe-shaped member is bolted, closed end forward, to the body rails and a tubular front crossmember. The engine and entire front suspension are mounted on this horseshoe. This design would be good for fleet operation as the entire assembly can be dropped out as a unit. When a car's engine or front suspension needed work, the assembly could be dropped out and a spare unit installed to get the car on the road in minimum time.

Independent suspension on all four wheels and fast, precision steering makes the car very sure-footed. Turning radius is short. These characteristics facilitate handling in traffic or on country roads.

The ride is firm but smooth. Seats are comfortable and deep to give full support for the thighs. Even driving for long periods, fatigue was less than noted in some bigger cars. Five adults are comfortably accommodated and access to both front and rear seats is considerably easier, and back seat more comfortable, than in today's passenger cars. This can be important in taxi service.

Driver controls are conventional with a few exceptions. A key supplies battery power to all electrical accessories. There is a 4-position starting handle. The handle is moved up to cut off fuel and stop the engine. It is in horizontal position for driving. Moved part way down to a detent, it cuts in the glow plugs. A dash indicator shows their glow intensity. Movement beyond the detent engages the starter. After a start, the handle is returned to horizontal position. So far, in temperatures down to 34°F, there has been no difficulty in starting.

One other unconventional control is for dash-mounted idle-speed adjustment. You can set the speed up for warm-up and later adjust it for optimum smoothness when engine gets up to temperature.

Economics

Mileage to date is only 2983 and thus can only give some indication of what to expect. Certain non-recurring expenses, less than $25.00, were involved in getting the car in top condition. This work consisted of the deficiencies noted earlier. The only other repair expense was replacement of some heater hoses (one was chafed) and replacement of all hose clamps. Some $7.00 was involved.

Fuel was bought at truck stops. No. 1-D is recommended for the car. It was bought whenever available but the bulk purchased was No. 2-D. The lower end-point and higher cetane of No. 1-D is preferred since most of the car's mileage is in short hauls. Also, winter is coming up.

A total of 83.1 gallons was used in 2982 miles for an average of 35.88 mpg. This agrees quite favorably with the factory's quoted figure of 37.3 mpg. As a matter of fact, we think the next check will average slightly higher. Early mileage checks during the "driver training" period showed around 34 mpg. This is included in the current average. Incidentally, this is a strong argument for driver training.

Total fuel cost was $23.30 which figures out to $0.28 per gal, including all taxes. This is a fair average for the posted price in truck stops in this area. Fuel costs figure out to 7.8 mills per mile.

The factory quotes lube oil consumption at 196 miles per pint. We didn't burn anything like this. Crankcase capacity is four quarts with about a pint additional in the filter. Recommended oil change period is 2500 miles and a quart of makeup was added in this period. A supplement 1 oil, API DM classification, was used. Figuring a retail cost at $0.60 per quart and a total of five quarts (including the change), oil costs were $3.00 or an additional mill per mile for a total of 8.8 mills per mile in direct operating costs.

These are about as close as costs can be figured at this point. A more complete story will be possible at a later date. We'll let you know.

Noise and Vibration

Noise level is higher than in contemporary passenger cars, particularly at idle and when the engine is winding up in the lower gears. Above, say, 30 mph where wind and road noises become a more predominant factor, noise is less noticeable. As one yardstick, a standard car radio is clearly audible at all speeds at normal volume levels. Compared to some light trucks we've ridden, there's little choice as far as noise goes. At no time is noise level seriously objectionable. It's quieter than the popular Volkswagen.

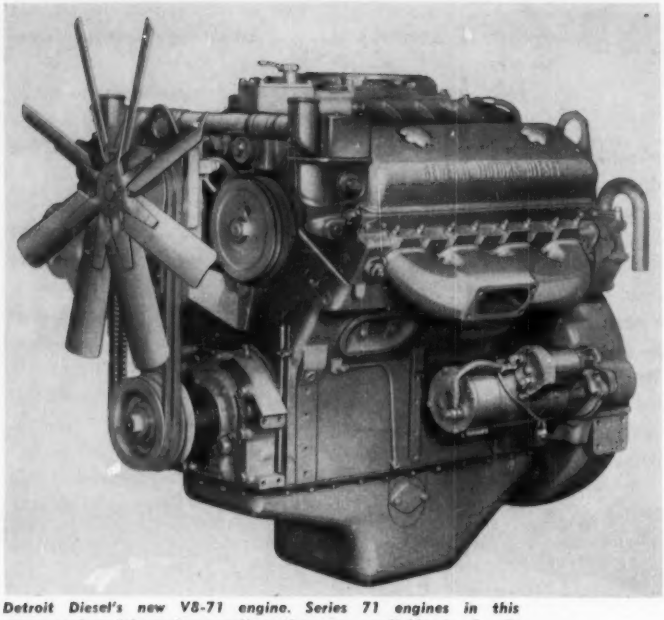
Vibration is noticeable only at idle. The engine is flexibly mounted on large well-designed rubber dampers. At operating speeds there is no more vibration than in the average car.

Comment

Interest aroused by the car is tremendous. One of the most frequent questions is, "Do you recommend diesels for passenger cars?" No, we don't. But we do think that they have great potential in certain light vehicle services.

Experience to date would indicate that substantial cost savings with few if any operational drawbacks are possible in taxi service with its relatively high annual mileage. Potential savings are also possible in stop-and-go delivery service. City buses have demonstrated the diesel's capabilities in this field. Where long idle periods are involved, the vastly better low-load fuel economy of diesel versus gasoline engines should show substantial savings.

How far and how fast use of diesels in this field progresses will depend to a great extent on the availability of such vehicles and their costs. We have the engines and in a growing number of makes and models, common use of major components for diesel and gasoline versions is pulling down the diesel's cost. Also, suitable fuel injection equipment is now cheaper. Let's make some vehicles available; they'll sell.



Detroit Diesel's new V8-71 engine. Series 71 engines in this space and weight-saving configuration are available in 6-, 8-, 12- and 16-cyl models with from 262 to 675 maximum horsepower.

THE GM DIESEL "ALL-PURPOSE" POWER LINE 20 TO 1650 HP* IN ONLY THREE CYLINDER SIZES

PREVIOUS MODELS	NEW ENGINES	BHP CONTINUOUS	BHP MAXIMUM
	2-53	20-35	47
2-71		33-48	67
	3-53	38-64	97
3-71		51-75	118
	4-53	51-87	130
4-71		75-113	167
	6V-53	76-130	195
6-71		112-170	252
	6V-71	112-170	252
6-110		160-237	335
TWIN 4-71		150-226	334
	8V-71	150-226	334
TWIN 6-71		224-340	504
	12V-71	224-340	504
TWIN 6-110		320-474	670
	16V-71	300-454	675
QUAD 6-71		448-680	1008
	24V-71 (TWIN V-12)	448-680	1008
	32V-71* (TWIN V-16)	600-908	1350*

*When turbocharged 1650 HP

*Based on 60°F, 29.92-in. of mercury (dry)—the equivalent of sea level.

Fig. 1

Detroit Diesel's "Family of Engines"

A new 53 Series and expansion of the 71 Series to include vee-types gives Detroit Diesel a complete single-engine horsepower range from 20 to 675, with twins to 1650 hp. In the new line-up, interchangability and installational flexibility have reached a new high.

"EIGHT new additions to five present basic engines" is the capsule story of what Detroit Diesel has done. Of the additions, four are engines of a brand new 53 Series. Six are vee-type versions of the 71 Series. The Series 6-110 remains in the lineup.

Detroit Diesel has done more than just add some engine models. There has been a realignment of thinking and of the plant to meet the requirements of a broad plan. Merchandising studies and surveys of customer needs, plus some imaginative thinking about new fields for diesel penetration, have indicated what to build. Shift of sales emphasis from the factory to the field has been going on for some time.

Thus, it was important to put into the hands of their distributor sales organization a line of engines covering a broad horsepower range, with maximum parts interchangeability, and versatility of both application and arrangement of individual engines with respect to component location, rotational direction, etc. This would enable distributors to meet a maximum number of specialized customer needs.

This affected the plant too. A high degree of parts interchangeability and anticipation of higher sales means that more of such parts will be made. While Detroit Diesel has always had good production facilities and assembly lines, this concept of manufacture could now be extended to come closer to automotive practices.

Special-purpose machines were installed in production lines. For example, there's the line for V-71 engine blocks. These come out completely drilled and with cylinder bores finished. High-volume parts are all produced in similar fashion. Engine as-

sembly lines were rearranged and more added. Engines progress to final completion in true Detroit tradition on long conveyer systems.

Outcome of the overall plan is the range of engines and horsepowers shown in Fig. 1. It would appear that there is a great deal of overlapping and duplication. There is. But only insofar as horsepower is concerned. Weights, lengths and rpm (among the Series) vary. This permits close matching to the power requirements and physical limitations of the installation.

Take a horsepower requirement of 127 hp. This could be obtained with the 4-53, 4-71, 6V-53, 6-71 and 6V71 engines. Choice would be dictated by service and physical requirements of the application. If maximum power was demanded for only short periods, the 4-53 might be suitable. The 4-71 could handle more severe operation with a little power in reserve while the three larger engines would have no trouble at all with a continuous 127-hp demand.

Now suppose that space is a limiting factor, that a 4-71 would fit, but that more power is needed. The 6V-53 and the 6V-71 would fit as to length and would require only an additional two inches in width. This physical interchangeability pattern runs all through the line.

Users can buy just the power they need for the intended service with assurance that if power needs should increase, they can get more power into essentially the same space. At present, all engines are naturally-aspirated and have major components of cast iron. Yet the new engines have improved horsepower to weight ratios as seen in Fig. 2. Turbocharging and broad use of light metals are also planned. This will further extend the power range and improve the already excellent horsepower to weight ratio of these engines.

"E" Engine Design

A short time ago, Detroit Diesel introduced their 71E engine. It is important that features of this engine

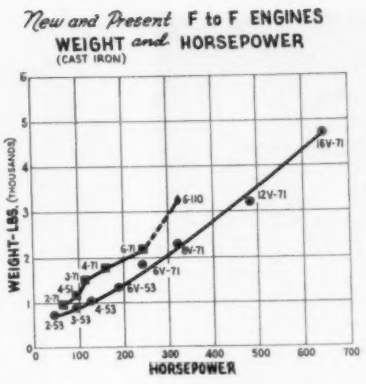


Fig. 2

be understood as it is the basis for the V71 and the 53 Series engine design. A major feature is better engine breathing. This was obtained by:

1. Changing standard "figure 8" ports to a longer oval design for a 58% increase in inlet area.

2. Use of a 4-valve head, increasing exhaust area 23%. These changes are shown in Fig. 3. Note also that a "fire ring" was installed ⅛-in. below the piston top. Its affect on port timing and piston crown temperatures are shown.

What you do with the capability for getting more air into the cylinder depends on the design objectives. Detroit Diesel chose to move in the direction of maximum fuel economy at conservative ratings rather than toward higher cylinder output. This could come later with turbocharging.

Reduced restriction to air flow, considering the engine as an orifice, meant that more air would be used, far more than required for efficient combustion. The engine has to pump this air. A gear reduction, built into the blower to avoid any sacrifice in engine gear train interchangeability, reduced blower speed. Sufficient air was supplied with a saving in blower power requirement of 18.5 hp or 57% of the total.

All these changes altered the required injection pattern. The "E" engine uses an injector tip with eight 0.0055-in. holes and an included spray angle of 165 deg compared to

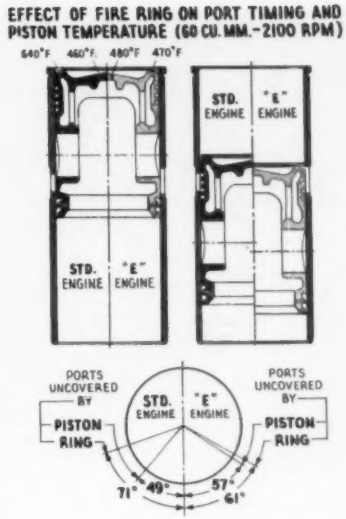

EFFECT OF FIRE RING ON PORT TIMING AND
PISTON TEMPERATURE (60 CU. MM.-2100 RPM)
640°F 460°F 480°F 470°F
STD. ENGINE
"E" ENGINE
PORTS UNCOVERED BY PISTON RING
71° 49° 57° 61°

Fig. 3

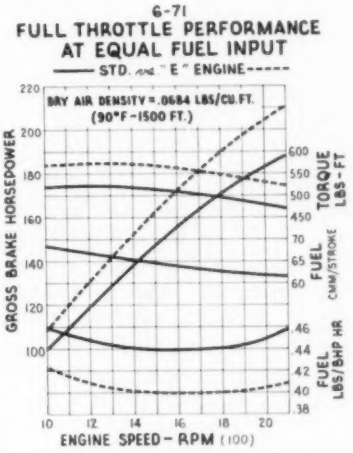


Fig. 4

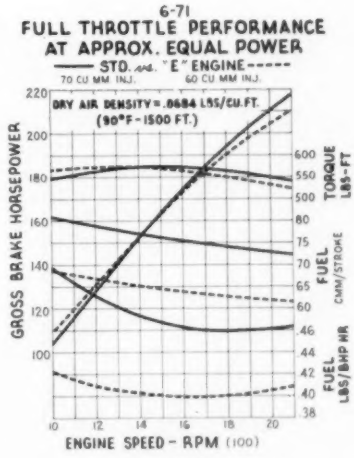
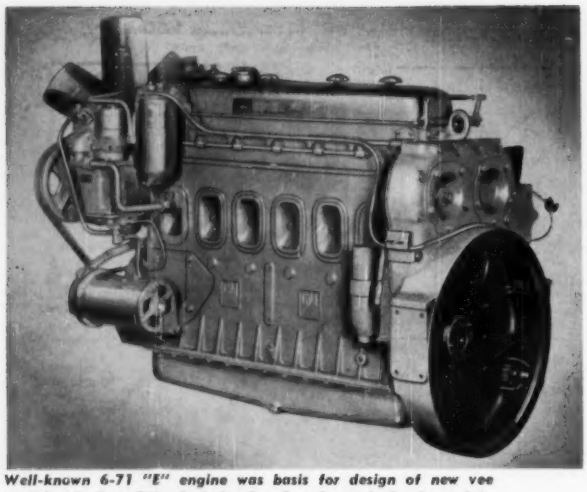


Fig. 5



Well-known 6-71 "E" engine was basis for design of new vee models. In-line 71's include 2-, 3-, 4- and 6-cyl models.

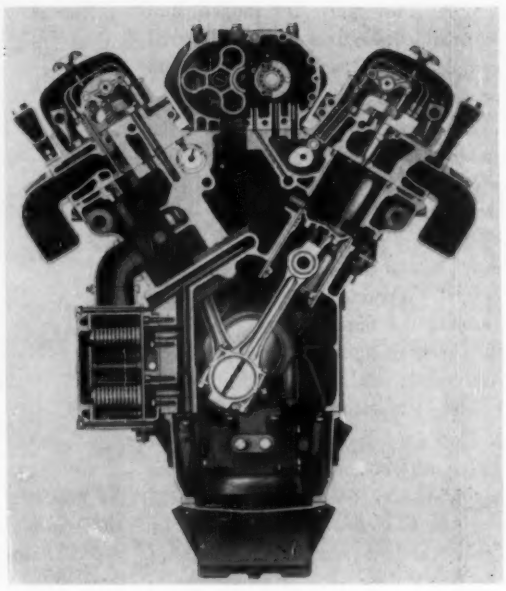


Fig. 6, a transverse cross section of the V12-71 diesel shows block construction and arrangement of engine components. Another camshaft has taken the place of the balance shaft that is found in the in-line Series 71's.

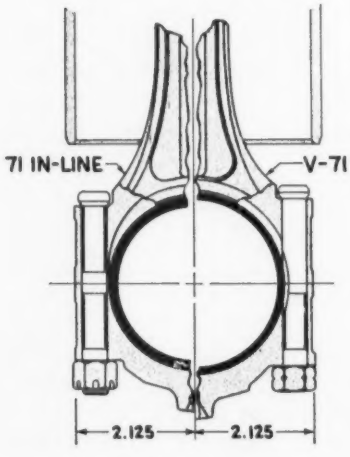
the standard engine tip with seven 0.006-in. holes and an included spray angle of 155 deg.

Performance tells the story. Fig. 4 shows that with the same fuel input, the "E" engine is capable of higher horsepower and torque at lower fuel consumption than the standard engine. At substantially equal performance (Fig. 5), the "E" engine's fuel rate is considerably lower. While peak horsepower for the "E" engine is lower by 8 hp than for the standard engine, its improved torque and altitude performance has proved it to be equal to the standard engine in actual field performance—with a substantially reduced fuel rate and lower thermal loading.

For these reasons the new V71 and 53 Series engine design was based on the "E" engine concept.

Fig. 7

CONNECTING ROD COMPARISON



V71 Series Engines

Use of the "E" engine concept and the rigid interchangeability requirement dictated much of the vee-engine design. Emphasis, here, will be on those engine components and features exclusive to these engines.

First, the *cylinder blocks*. A transverse cross-section, Fig. 6, shows block construction and arrangement of engine components. Minimum weight per horsepower was a major design objective of the entire development program and results are seen in the 53 Series engines as well as in the V71 engines. Metal had to justify its existance to stay in the design.

The block consists of three box sections—the crankcase, air box and water jackets. Internal tension members extend from the headbolt bosses to main bearing bulkheads. A "shelf" at the top of the lower cylinder liner bore stock adds longitudinal and transverse rigidity and helps maintain bore alignment.

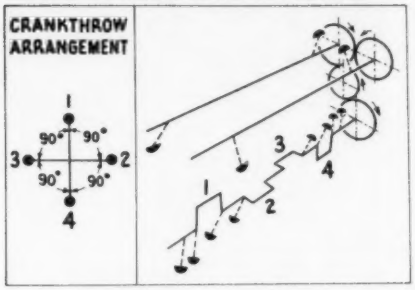
Block length was set by the 5¾-in. cylinder spacing of inline engines so that standard cylinder heads could be used. The left bank is staggered 1.2 in. ahead of the right since side-by-side connecting rods are used. V71 blocks are built in 6V, 8V and 12V sizes. The 16V consists of two 8V blocks mounted front-to-front. Vee angle between the banks is 63½ degrees. Why this figure? Simply for interchangeability of timing gears between in-line and vee engines. At this angle, established gear diameter and center distances from the crankshaft center could be maintained. This unconventional angle proved feasible with no sacrifice in engine smoothness.

Crankshafts had to be designed for each vee engine. Since all use the same power assemblies, journal and pin sizes, as well as the bearings, could be standardized. Many crankthrow arrangements were evaluated to insure that those finally used were the best for that particular engine in terms of the firing interval, shaft balance and overall engine balance.

8V-71 BALANCING SYSTEM

Fig. 8

PRIMARY COUPLES ARE BALANCED WITH COUNTERWEIGHTS ON CAMSHAFTS AND CRANKSHAFT.



COUNTERWEIGHTS ON THE CRANKSHAFT ARE FOR ROTATING AND RECIPROCATING BALANCE AND TO REDUCE BEARING LOADS ON #2 AND #4 MAIN BEARINGS.

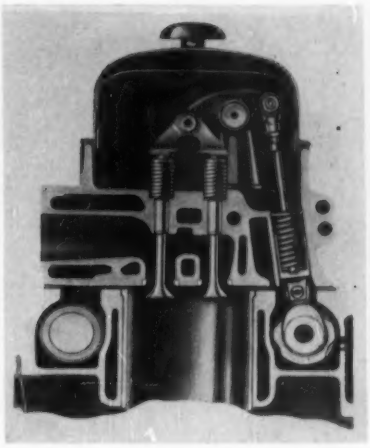


Fig. 9. A stamped clevis-type bridge attached to the end of the rocker arm actuates transverse pairs of valves. This design automatically balances valve lash. Its low weight reduces high-speed spring and follower problems.

With two *connecting rods* on each throw, both crankpins and main journals were made larger in diameter—2.75 in. to 3.0 in. on the pins and 3.5 in. to 4.5 in. on the mains. To accommodate the larger pin diameter and still retain capability of removing the rod through the 4¼-in. cylinder bore, the change shown in Fig. 7 was made in the connecting rod and bearing.

Crankcheek thickness was necessarily reduced from that of the 71 crankshaft so as to hold cylinder center distances. Yet the shafts had adequate bending and torsional strength. Resistance to bending fatigue at the fillets was increased by rolling the fillet areas as in the standard 71 crankshafts. Torsional vibration characteristics were found to be excellent. The only engine requiring damping was the 12V-71 and a single viscous damper of large size was applied.

Engine balance also worked out well. Carefully-calculated counterweights are spaced along the crankshaft of each engine in accordance with its needs. They take care of rotating and reciprocating balance, reduce bearing loads resulting from unbalance and in conjunction with counterweights on the camshafts, balance primary and secondary couples. A typical balancing system is shown in Fig. 8.

Camshaft counterweights provide another example of the extent of interchangeability. The standard cam and balance shaft of the 71 engines became two camshafts in the V71 engines. Counterweights are made integrally with the drive gears at one end and the accessory drive gear and pulley at the front of the engine. Calculations showed that the least weight was required for the 6V71 and this was made the standard. The same gears and pulleys are used for all engines, suitable additional balance weights being attached as required.

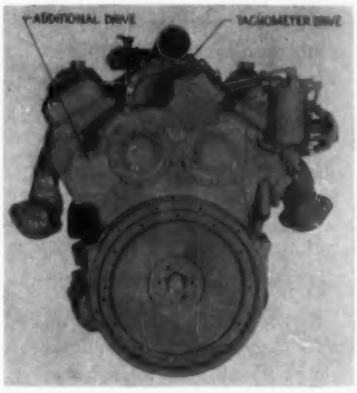
Three *cylinder head* sizes serve seven basic engines. For example, the 4-cyl head is used on the 4-71E, 8V-71, and 16V-71. The external fuel supply and spill manifolds are now integral, being formed by drilled passages in the head. The same short pushrod design of the standard 71 engine is used for rocker arm and valve actuation. A stamped clevis-type bridge attached to the end of the rocker arm actuates transverse pairs of valves. This design, Fig. 9, automatically balances valve lash and being light, reduces high-speed spring and follower problems. It is simple and avoids many complications of guided bridges.

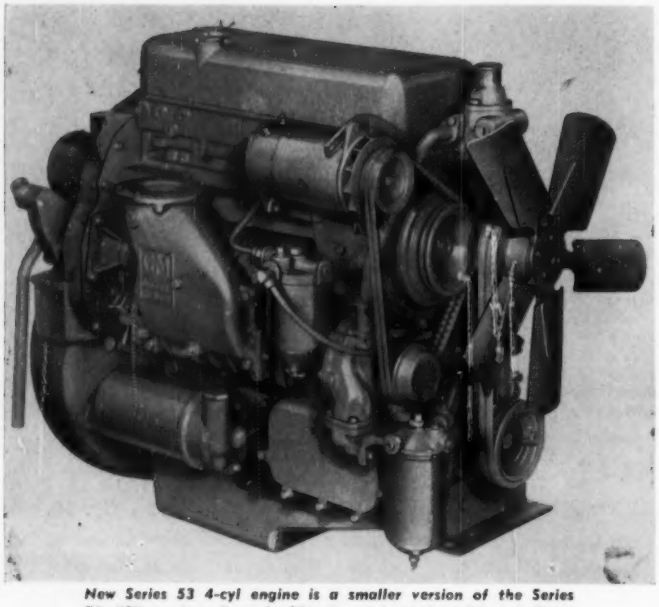
Two basic *blowers*, shorter than the standard unit and with a 2.05 to 1 drive ratio, are used on all four vee engines. They are arranged in tandem on the 12V-71 engines. Typical mounting arrangement for fuel supply pump, governor, tachometer and accessory drive is shown in Fig. 10.

Full-pressure *lubrication* including under-piston cooling spray, full-flow filtration and oil cooling is provided on all engines. The oil pump is mounted on and driven by the crankshaft in the 6V-71 and 8V-71 engines. On the larger engines they are mounted in the oil pans. Generous openings in the block casting lead to the top deck and are provided for positive crankcase breathing.

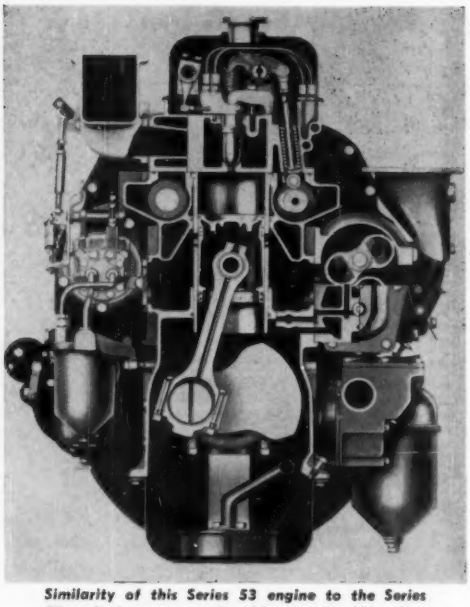
The *cooling system* features a high circulating flow rate to minimize the necessary radiator size and provide for cooling requirements of special components such as torque converters, torqmatic brakes, etc. A "full-flow" blocking-type bypass system of temperature control is used.

Fig. 10. Typical mounting arrangement for fuel supply pump, governor, tachometer and accessory drive. The tachometer drive is off the blower shaft.





New Series 53 4-cyl engine is a smaller version of the Series 71 "E" engine. Bore is 3⅞ in. and stroke, 4½ in. These engines will be built in 2-, 3-, 4-cyl and V6 executions.



Similarity of this Series 53 engine to the Series 71 unit is apparent in this cross section. One major difference lies in the use of wet-type liners.

Series 53 Engines

Ground rules for the "53" design were (a) the 71E combustion concept was to be used and (b) model versatility of the 71 engine was to be retained. The engine was to be built in 2, 3, 4, and 6V versions. All this was done. Essentially, these engines are a scaled-down version of the Series 71E and V71 engines with a few notable exceptions. This is apparent in Fig. 11.

Wet cylinder liner construction was used. Blocks were designed with an open internal structure that contributed substantial weight reduction. It also gave good coring support during casting, permitting minimum wall sections to be used. Sealing of the wet liners is by the flange at the top and synthetic "O" rings just above the ports.

Vee angle of the 6V-53 block is 66¾ degrees, this again being dictated by interchangeability requirements of gear train components. Rotating balance and balance of forces and couples were compensated as in the case of the V71 engines.

Cylinder heads have the internal fuel supply and spill manifolds. Valve actuating mechanism is similar to that of the V71 engines. Shortness of these heads made longitudinal cooling water flow practical as opposed to the lateral flow in the longer V71 heads. Height of the head was set to accommodate the standard 71 injector body, again in the interest of interchangability. Internal parts are altered to provide suitable fuel delivery volume.

The *blower* is a departure from 71 engine types. Rotors have two lobes and the shafts turn in bores in the aluminum alloy end-plates. The 2-53 and 3-53 blowers drive directly off the gear train but the larger 4-53 and 6V-53 blowers are driven by a quill shaft and torsionally-flexible coupling. All turn at approximately 2½ times engine speed.

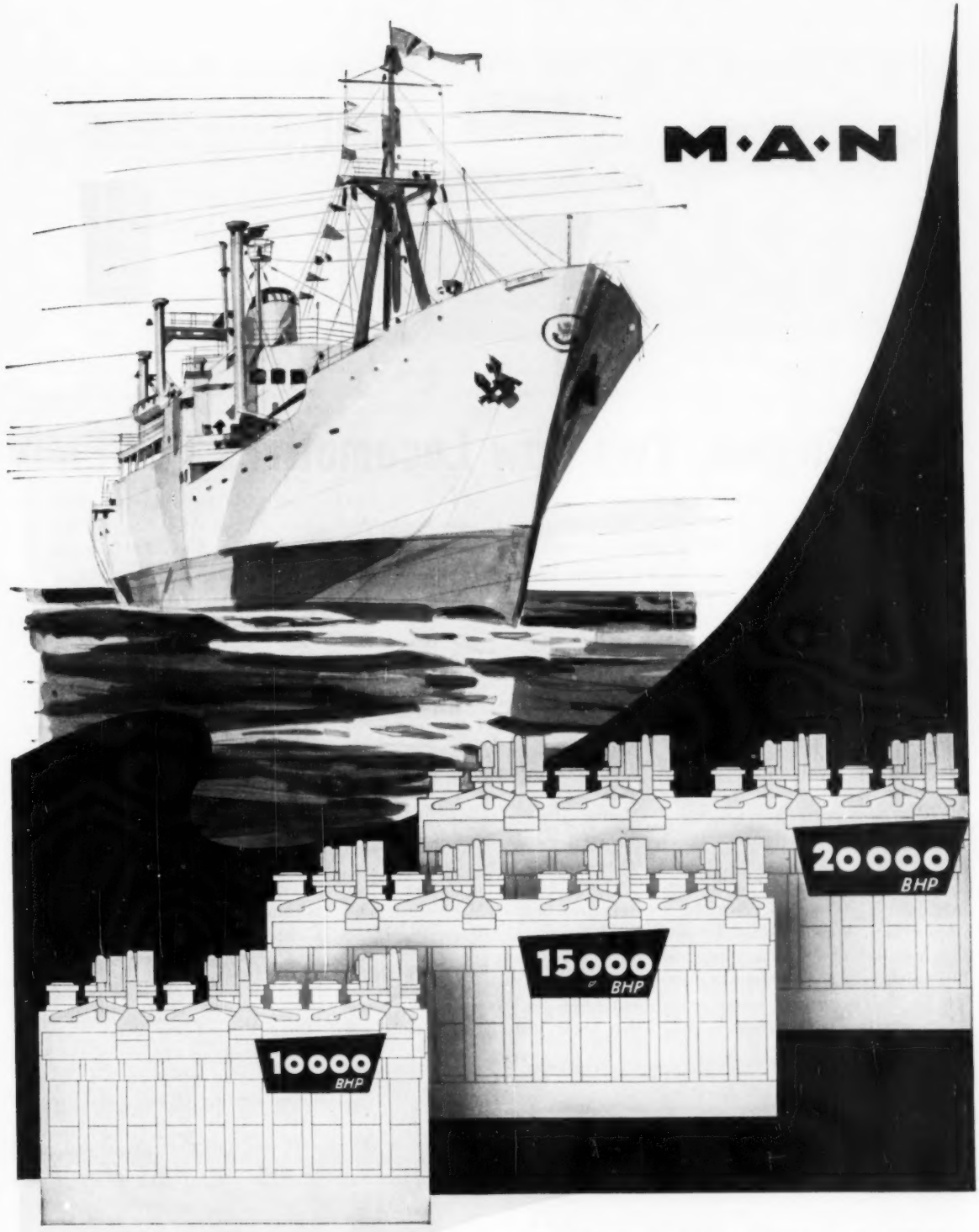
Summary

This "all-purpose" power line with all the various sizes, shapes and power outputs, all provided with three basic cylinder sizes and with a high degree of parts interchangeability in each size, represents quite an achievement. This is particularly true since eight different engines were developed and tooled at the same time.

They have provided Detroit Diesel with greater horsepower coverage, better horsepower to weight and space ratios and improved fuel economy. And since with the 71E design, thermal as well as mechanical loads are conservative, durability of these engines is greatly improved. Lower production costs are a normal outgrowth of the high degree of interchangeability achieved and consequent high production volume of many parts.

It should be added here that huge capital investment in new production tooling, assembly lines and block testing facilities, plus 287,000 sq ft of new factory area, was necessary for production of these engines. Currently, it looks as though savings in production costs will balance investment costs with the result that cost per horsepower of these engines will remain somewhere near today's levels.

Production on these engines has been programmed and started. They are ready for use after over 120,000 hours of testing, half being in the field under service conditions selected for their severity.

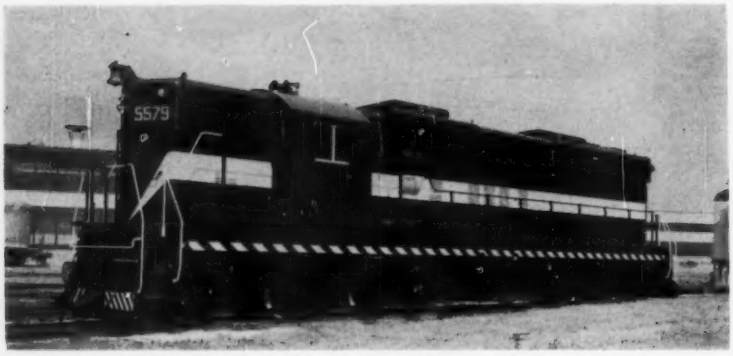


M. A. N. Diesel Engines are built in 11 countries by 25 licensees

TURBO-CHARGED TWO-STROKE
MARINE DIESEL ENGINES
WITH 5 TO 12 CYLINDERS

MASCHINENFABRIK AUGSBURG-NÜRNBERG AG · WERK AUGSBURG
GERMANY

REPRESENTED ALL OVER THE WORLD



The new SD24 domestic locomotive was designed for fast movement of long, heavy freight trains. It is powered by the 567D 2400-hp turbocharged diesel made by EMD.

New Engine, Two New Locomotives For EMD

Turbocharged 567-D engine powers new 2400-hp freight locomotive. Also, EMD makes a stronger bid for export locomotive sales with new simple, lower-cost unit.

TWO new EMD locomotives are to be put on the market. One, a domestic model, is designed to help U. S. railroads speed up high-tonnage freight train movement. The other, an export model, is to help dieselize small railroads in non-manufacturing countries of Asia, Africa and South America.

These foreign railroads still operate about 50,000 old and costly steam locomotives. A major reason for this has been lack of diesel locomotives of the weight, size and horsepower suitable for their specialized requirements —at costs they could afford.

The Domestic Locomotive

The SD24 (Special Duty 2400 hp) is designed around the new turbocharged version of the GM 567 Series diesel. The Series 567 has powered all locomotives made by the Electro-Motive Division since 1938. The highest domestic rating of this engine up to now has been 1750 hp.

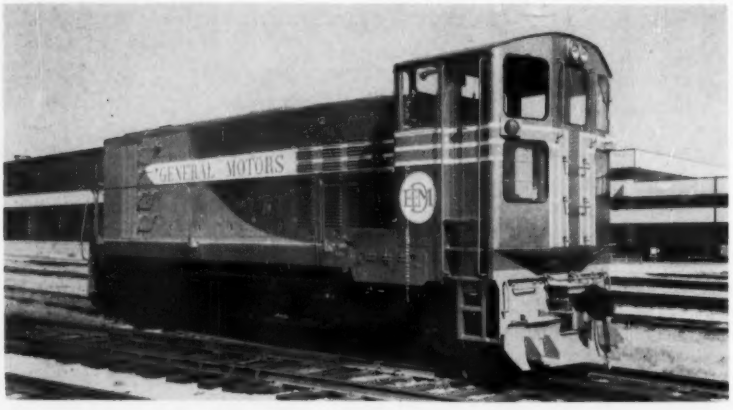
The SD24 does not replace any locomotives in the EMD line. It adds one to cover a highly-specialized need on some railroads.

A prototype of the SD24 has been under tests for several months. These tests show that the new units will haul heavy-tonnage trains faster with fewer locomotives. It can handle heavy tonnages on level grades about 16% faster and up a 1% grade 25% faster than existing EMD units.

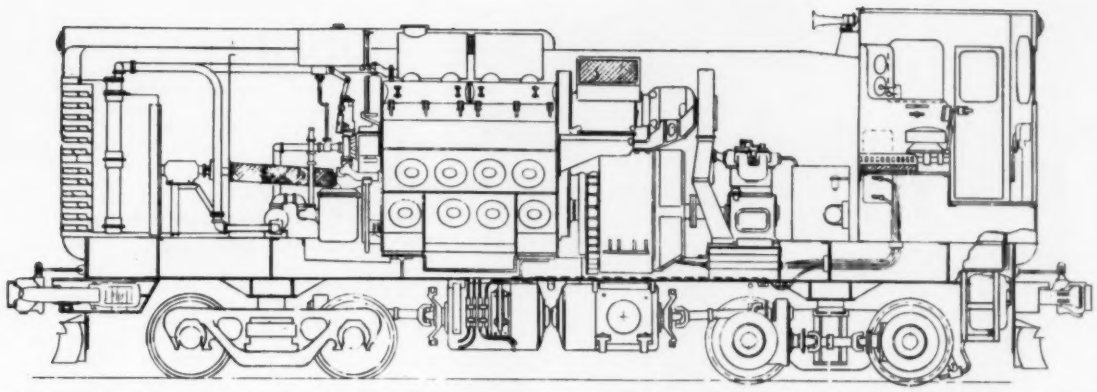
Its overall length is 60 ft, 8½-in.; height is 15 ft, 2⅜-in.; and width is 10 ft, 8-in. Total weight is about 328,000 lb.

The SD 24 is the first railroad application of the newly-developed turbocharged 567 Series engine, the 567-D. This is the same engine that powers the new 6000 kw peaking and reserve plants for electric utilities (See "Diesel Power" June 1958).

Several design changes of the 567 Series engine were required due to higher loading of the turbocharged version. These changes involved the crankcase, liner to crankcase seal, piston and rings, piston pin bearing,



EMD's GA8 locomotive powered by an 800-hp diesel is designed for overseas service. This lightweight unit can handle freight or passenger trains and do its own switching.



Line-drawing of GA8 export locomotive shows traction motors hung from bottom of underframe instead of in trucks as in conventional diesel-electric units and transmission to driving axles through shafts and bevel gears from motors, similar to automotive practice.

conrod bearing, cylinder heads and valve assembly, camshaft, valve gear, injector, oil and water pumps, and exhaust manifolds.

At low engine speeds or load, there isn't sufficient energy in exhaust gases to operate the turbocharger at speeds high enough to supply adequate air to the cylinders. The turbocharger is then driven directly by engine gears. An over-running clutch in the gear train allows the turbocharger to become free-running when exhaust gas energy drives it faster than the engine will run it.

Full technical details on this new engine have not yet been released.

The Export Locomotive

The new export model, the GA8, comes in at the low-weight end of EMD's line. It is an 800-hp extremely-light road locomotive capable of handling passenger or freight trains and doing its own switching.

While it is primarily designed to meet requirements of the enormous overseas market, it has attracted considerable attention among U. S. railroad men. Preliminary study of applications in this country are being made.

The locomotive contains a number of somewhat radical innovations to fit it to the requirements of the overseas lightweight railroads. For example, the following problems had to be met.

Overseas railroads which the new unit will serve have very light rail and bridge structure. Traffic is low. Locomotives operate only about 20,000 miles a year as compared with the 100,000 miles a year for a freight locomotive and 200,000 to 300,000 for a passenger locomotive in the U. S. Track and bridges are old. Tunnel and station clearances are small. Railroads do not have modern shops and cannot afford to install them. Yet these railroads need the diesel economies and service improvements which have meant so much to American railroads.

These problems are overcome by the GA8. Its low first cost permits amortization despite the low annual utilization on these railroads. Higher GA8 utilization results because it can handle all three services, freight, passenger and switching. It is simple to maintain thus eliminating installation of elaborate service facilities. It is rugged and designed for long-life since standard components long used in U. S. locomotives are included. It has a very low axle loading despite its high tractive effort ability. This enables it to improve service without overloading tracks.

Here are some of the locomotive features that permitted overcoming of these problems. The unit is compact. It is 32 ft, 6-in. long, and 12 ft, 10½-in. high. It weighs only 52 tons, as compared with 100 tons in a 600-hp U.S. switcher.

Standard high-production EMD components are used. For example, the 8-cyl, 800-hp Model 567 diesel, generator, and two traction motors are all standard EMD equipment. This cuts production costs and promises reliability and long life.

Simplicity of maintenance is accomplished in several ways. For example traction motors are hung from the middle of the underframe and these can be serviced without dropping the trucks.

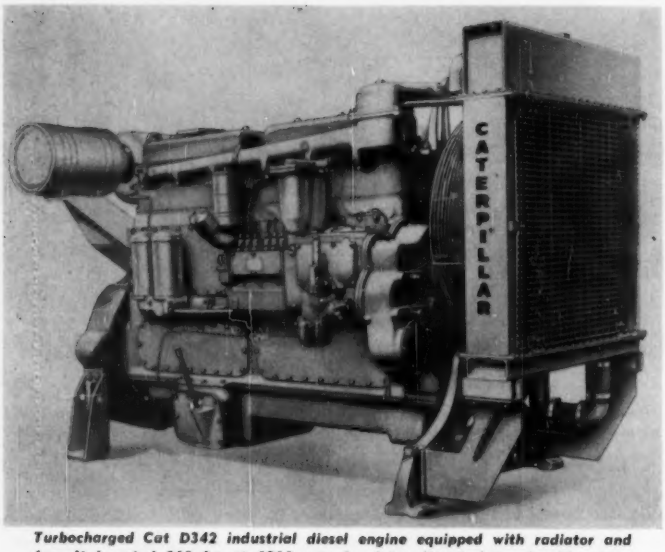
Drive shafts lead from each of the traction motors to bevel drive gears on each axle, similar to automotive practice. This makes possible the use of air-operated disc brakes applied to each drive shaft at the point where it leaves the traction motor. These have been highly successful on passenger cars in high speed trains, but this is their first application on a modern locomotive.

The control system is so simple that less electric wiring is used than is found in many modern automobiles.

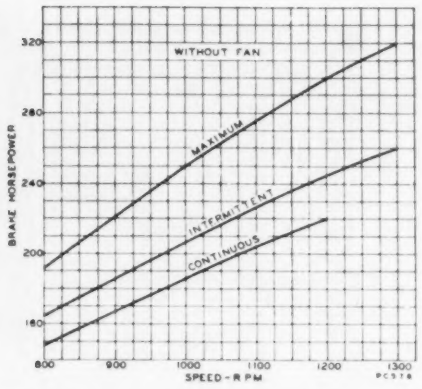
The locomotive is geared for a top speed of 52 mph. Overseas curves, grades, lightweight track and age of tracks and bridges severely limit speed.

Conclusion

With production of the latest domestic and export unit beginning in the second quarter of 1959, EMD will have eight domestic and six export locomotive models. These cover most of the normal motive-power needs of railroads throughout the world.



Turbocharged Cat D342 industrial diesel engine equipped with radiator and fan. It is rated 260 hp at 1300 rpm for intermittent duty. A wide range of attachments make this heavy-duty unit suitable for many applications.



D342 turbocharged engine horsepower ratings. Ratings are to be used as a general guide for world-wide use in a broad range of applications. Other ratings giving better performance and better economy are available to meet the requirements of specific applications when detailed information is known.

Cat Has Two New Models

New D342 and D311 diesels give Caterpillar more flexibility in meeting requirements of industrial, electrical and marine applications in popular sizes.

TWO new engines have expanded the Cat line. The larger of these, the D342 (Series C), provides Caterpillar Tractor Co. with a higher-output engine for industrial, electrical generation and marine applications. The other, the D-311 (Series H), is a versatile low-hp engine which can be set up in various arrangements to meet the requirements of many applications.

D342 (Series C)

The 4-cycle, 6-cyl D342 (Series C) is offered in three diesel turbocharged versions, one for each of the applications given above. Plus these, the engine is available in two spark-ignition versions with 7.5:1 or 10:1 compression ratio.

When offered as an industrial engine it develops 260 intermittent hp at 1300 rpm. Equipped with a new Twin Disc MG512 reverse and reduction gear, the marine version produces 220 continuous hp at 1225 rpm. The marine gear is available with either 2:1 or 3:1 reduction ratio.

A D342 turbocharged 60-cycle generator set has a continuous rating of 150 kw at 1200 rpm. For 50-cycle operation it is rated 125 kw at 1000 rpm.

Spark-ignition versions of the D342 are rated 215 hp (continuous) for the 7.5:1 compression ratio unit and 235 hp for the 10:1 compression ratio engine. Both ratings are at 1300 rpm.

Features of the new D342 engine include a new Cat turbocharger plus new exhaust porting and manifolding. Both exhaust and intake manifolds are now on the same side of the engine and run side by side. The turbocharger and air cleaner are rear mounted, giving the engine a lower profile and greater compactness.

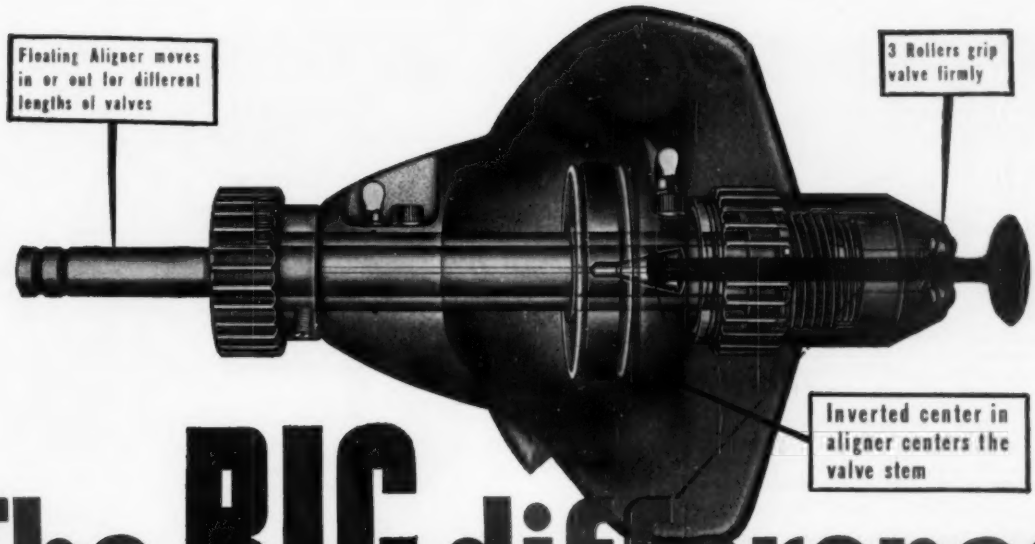
An efficient, special-design, dry-type air cleaner is furnished on the basic engine as standard equipment. An oil-bath type filter is offered as an attachment.

A wide range of other attachments make this heavy-duty engine suitable for many applications.

Cat D311 (Series H)

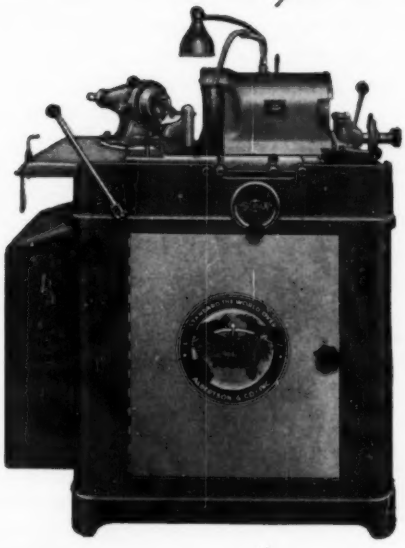
The new Cat D311 (Series H) engine is a 4-cyl diesel with a 4-in. bore and 5-in. stroke. This 4-cycle, 252-cu in. displacement diesel is offered as a naturally-aspirated unit or turbocharged. Industrial, electric and marine versions are available.

(*Continued on Page* 56)


Floating Aligner moves in or out for different lengths of valves
3 Rollers grip valve firmly
Inverted center in aligner centers the valve stem

The BIG difference

is in the SIOUX QUICK-ACTING ROLLER CHUCK!



IF you had to choose one feature making the largest contribution to the speed and accuracy of the SIOUX Valve Face Grinding Machine it probably would be the quick-acting, easily cleaned, roller chuck. The inverted center floating aligner holds the valve accurately in the position in which it operates in the engine while valves are ground to within .001". It's fast, easy and accurate.

But as in all fine machinery, there is precision in a multitude of details. Belts absorb vibration . . . a cast iron base provides rigidity and weight . . . way bars are precision made, hardened and ground to close limits, and wet grinding eliminates heat and distortion.

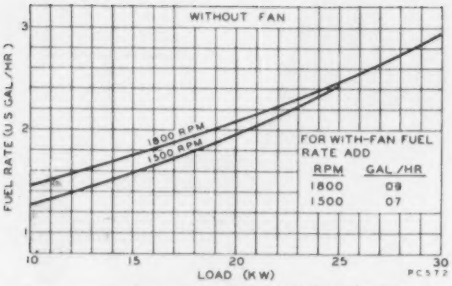
For over 25 years men who have to lay down their hard earned money have been comparing and choosing the machine they liked best. The results are that today there are more SIOUX Valve Face Grinding Machines in use than all others combined. Buy SIOUX and you buy the finest.

SIOUX

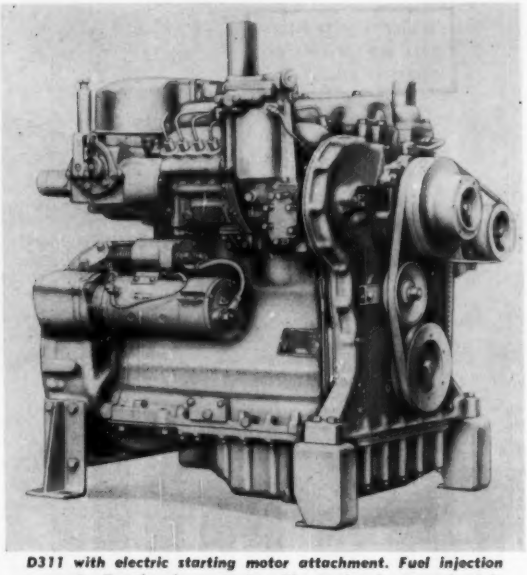
ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

NEW AIR IMPACT WRENCHES • *NEW* AIR SCREWDRIVERS • *NEW* "PELICAN" NUT ACCUMULATORS • ELECTRIC IMPACT WRENCHES • DRILLS • GRINDERS • SANDERS • POLISHERS • VALVE FACE GRINDING MACHINES • SCREWDRIVERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS



Fuel consumption curves for Cat D311. These were obtained with fuel oil having 35 cetane value, 32-36 API gravity at 60°F, viscosity of 33-42 SSU at 100°F and gross heat value of 19,500 Btu per pound.



D311 with electric starting motor attachment. Fuel injection pump is directly above starter. The engine is approximately 44-in. long, 27¼-in. wide, 36-in. high and weighs 1216 lb.

(*Continued from Page 54*)

A complete line of attachments including radiators, heat exchangers, clutches, torque converters, generators, marine gears and power take-offs provide a wide variety of arrangements.

For use as an industrial engine, the naturally-aspirated D311 (Series H) has an intermittent rating of 68 hp at 2400 rpm.

The generator set is a completely-matched package, the entire unit being covered by Caterpillar warranty. Cat's self-regulated, constant-voltage generator is standard equipment on it. The 60-cycle unit is rated 30 kw at 1800 rpm while the 50-cycle unit is rated 25 kw at 1500 rpm.

The marine version is available with two marine gear models, Capitol Model 2HE-10,100 with ratios of 1.5:1 and 2:1 and Model 2HE-10,-700 with a 3:1 ratio.

When the engine is designed for turbocharging, a water-cooled after-cooler system is also part of the design concept. It fits between the turbocharger and the intake manifold. Basically, this system cools the turbocharged air making it more dense and thus placing a greater weight of air into the cylinders. This increases engine horsepower substantially.

Major engine features include:

Combustion Chamber—The precombustion chamber common to all Cat diesels is used. The precombustion chamber can be removed to be cleaned or replaced.

Fuel System—The fuel system uses capsule-type fuel injection valves plus individual injection pumps similar to those used on all Cat diesels. These are designed and built by Cat. Injection valves are of single, large-orifice design.

Fuel—The engine burns No. 2 fuel oil (ASTM specifications D396-48T), often called No. 2 furnace or burner oil. The fuel has a minimum cetane rating of 35. Many of the new economy diesel fuels are suitable. Premium quality diesel fuel can be used, but it is not required.

Governor—Two Cat flyball-type governors, one with 5% to 7% droop or another with about 3% droop for closer regulation, are available. Woodward, or other special-purpose governors are also supplied if requested.

Crankshaft—The crankshaft is of forged alloy steel with "Hi-Electro" hardened journals. It is super-finished and dynamically balanced.

Bearings—Five main bearings of 2¾-in. diameter are used. Both main and conrod bearings are aluminum alloy precision-type.

Pistons—Pistons are made of aluminum alloy with a cast iron ring band. The top compression ring is chrome faced.

Cylinder Liners—Removable, wet-type liners are "Hi-Electro" hardened alloy cast iron. They are chemically treated for superior "break-in."

Cylinder Head—The cylinder head is of alloy cast iron, having two valves per cylinder, directed water cooling flow and it houses the precombustion chambers.

Crankcase— A strongly-reinforced one-piece, alloy cast iron crankcase with large inspection doors is used.

Balancer—A built-in harmonic balancer eliminates "4-cyl roughness" characteristic of unbalanced 4-cyl engines. This also increases parts life.

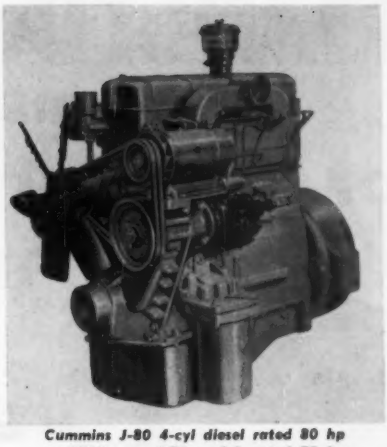
Starting System—Three starting systems are available for the new engine. A 15-hp vane-type air motor, 24-v direct electric, or 2-cyl, 4-cycle vertical, side-mounted gasoline starting engine may be selected. The gasoline engine can also be started manually or electrically by a 12-v electric starter.

Starting Aids—Electric glow plugs in the precombustion chambers, ether starting aids, and jacket water heaters are all available for use under severe low-temperature conditions.

These features indicate the same rugged characteristics and dependability common to other Caterpillar engines and so vital to the applications for which the two new units are designed.

Cummins Adds Two Small Engines

To meet growing demands for diesels in low-power applications for light vehicles, farm and construction equipment, etc., Cummins added the J-70 and J-80 units to the low-power end of their line.



Cummins J-80 4-cyl diesel rated 80 hp at 2500 rpm. J-70 model, rated 70 hp at 2000 rpm is identical in appearance.

CUMMINS is focusing attention on the low-power end of their line. They've just introduced two new engines the J-70 and J-80. These meet the growing demands for diesels designed for low-hp requirements of light vehicle, farm, construction and industrial applications. These applications include light trucks and busses, farm and crawler tractors, irrigation and pumping systems, shovels, cranes, graders, rollers, loaders, air compressors, generator sets and boats.

Both the new J-70 and J-80 are designed to bring the same benefits to operators with low horsepower requirements that diesels have brought to over-the-highway truckers and heavy equipment owners. Both units, rated 70 and 80 hp respectively, are a natural for converting gasoline engine-powered equipment used in numerous applications. Weight and size of the new units are such that these conversions can be made easily.

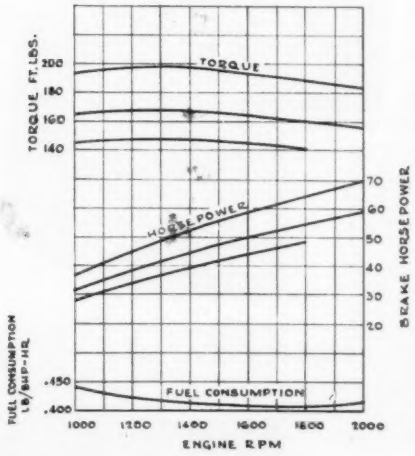
Contractors, farmers and other users of the J-70 and J-80 diesels during field tests over the past several years are well satisfied with their performance, economy of operation and reliability. Fuel costs alone have been cut up to 70 cents per hour over gasoline engines doing the same work. Plus this, they've gained other benefits including low maintenance costs and long engine life.

The J-70 and J-80 units are identical in specifications and with respect to accessory equipment except that the J-70 does not have a lube oil cooler and is rated 70 hp at 2000 rpm. The J-80 rating of 80 hp is obtained at 2500 rpm. Both units are 4-cycle, naturally-aspirated, 4-cyl engines. Each has a bore and stroke of 4⅛-in. and 5-in. respectively and a 267-cu in. piston displacement. The J-80 weighs about 1200 lb with standard accessories, the J-70 about 50 lb less.

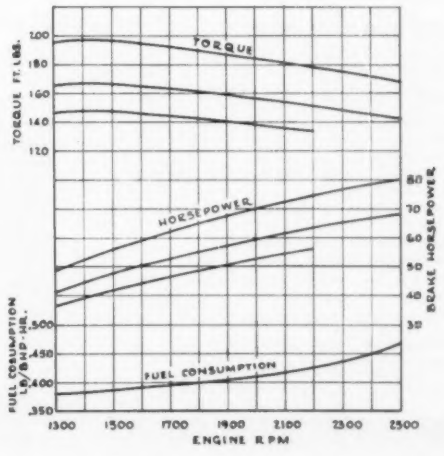
Parts common to both engines include:

Fuel System—The PT (pressure time) system exclusive to Cummins engines is used.

(*Continued on Page* 59)



Torque, horsepower and fuel consumption curves for J-70 unit are shown at left. Those for the J-80 engine are at right.



ADVANCED DESIGN PISTONS

By GILLETT AND EATON

for Longer Heavy Duty Service

TROUBLE-FREE with thousands in use

★ Low initial cost... Low cost per mile

★ Amazing increase in piston life

★ Maintains new engine power and performance

G and E WIRE INSERTS PUT CAST IRON WEAR IN TOP RING GROOVE

G and E Wire Insert Piston before machining (left) and after ring grooves are cut (right) showing how the steel wire forms a tough wear-resisting surface on both faces of top ring groove. The patented ferrous plug molded in the head (for diesel pistons) prevents burning through head and lengthens diesel piston life!

With the thousands of G and E "Wire Insert" Pistons in use for periods up to 3 years—a phenomenal record for trouble-free operation has been established. The "Wire Insert" greatly reduces top ring groove wear and increases piston life.

The "Wire Insert" piston design—exclusive with G and E—combines all the advantages of aluminum alloy pistons with the long life of steel in the top ring groove lands. No noticeable increase in weight—unequalled for rapid heat flow—and at low cost.

A pre-shaped steel wire is cast into the piston where the top ring is located. When the grooves are machined, the closely spaced wire surfaces form hard bearing areas on top and bottom faces of the groove. Result—reduced ring land wear, longer piston life at lower cost.

Get the G and E Wire Insert story today.

as LIGHT as aluminum...wears LIKE IRON

VANASIL*

"OIL-ABSORBING" PISTONS FOR GASOLINE AND DIESEL ENGINES

*Gillett & Eaton's trademark for a vanadium... high silicon... aluminum alloy.

VANASIL Pistons have repeatedly run way over 200,000 miles with only .002" to .005" wear on the top ring grooves. On-the-road ring breakdowns caused by badly worn grooves are almost eliminated because *Vanasil Pistons reduce top ring groove wear up to 75%!* Nothing else compares with the genuine G & E Vanasil —the original high Silicon aluminum alloy, proven by 19 years of use.

You Get ALL These Advantages Only In

GENUINE VANASIL PISTONS

G & E PROVED Vanadium...High Silicon...Aluminum Alloy

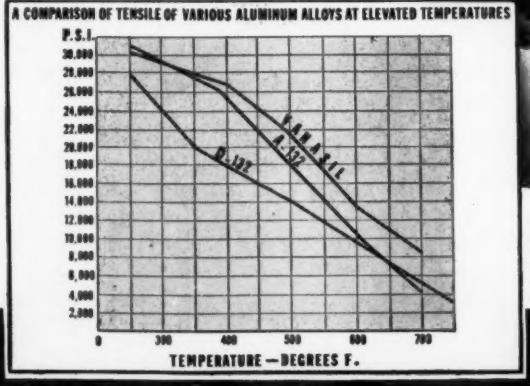
1. LIGHT WEIGHT—Same as other aluminum alloys.
2. SCORING, SCUFFING MINIMIZED—Because of "Oil Absorbing" microscopic porous texture.
3. LONGER LIFE—30% less friction—30% harder. Greater "hot strength"—see chart at right.
4. TOP RING—Breakage virtually eliminated because of reduced ring groove wear.
5. LOW EXPANSION—Characteristics of Cast Iron.
6. CLOSE CLEARANCES—Fitted with Cast Iron Clearances.
7. SOLID SKIRT DESIGN—No expansion devices required.
8. HIGH HEAT CONDUCTIVITY—Similar to other aluminum alloys.
9. PLATING—No tin or other break-in coating required.

VANASIL PISTON WAREHOUSE STOCKS

CALIFORNIA—Automotive & Industrial Whse. Co., 1341 So. Hope St., Los Angeles 15; Piston Supply Warehouse, 3768 Grove St., Oakland 12

NEW YORK—Bethlehem Equipment Co., 109 W. 64th St., New York 23

A COMPARISON OF TENSILE OF VARIOUS ALUMINUM ALLOYS AT ELEVATED TEMPERATURES



Write for complete information and prices on Gillett and Eaton's Wire Insert and Vanasil longer lived pistons.

"Our 90th Anniversary Year"

GILLETT and EATON, Inc. 846 DOUGHTY STREET LAKE CITY, MINNESOTA

(*Continued from Page* 57)

Governor— A mechanical flyball-type governor is built integral with the fuel pump.

Crankshaft—A high-tensile strength steel, forged crankshaft is used which has all bearing journals induction hardened.

Cylinders—Removable wet-type liners are used.

Pistons—Aluminum, cam-ground pistons have a knurled skirt for maximum lubrication efficiency. Each piston has three compression and one oil ring.

Conrods—Conrods are drop-forged.

Cylinder Head—The cylinder head is a single casting. Stellite inserts form the exhaust valve seats.

Intake and Exhaust Valves—Both valves are made of heat-resistant alloy steel. Exhaust valves have a stellite facing.

Oil Pan—The oil pan is made of aluminum. It holds 3¼ gallons of lube oil.

Housing—The flywheel housing is of the SAE No. 3 type. It is also made of aluminum.

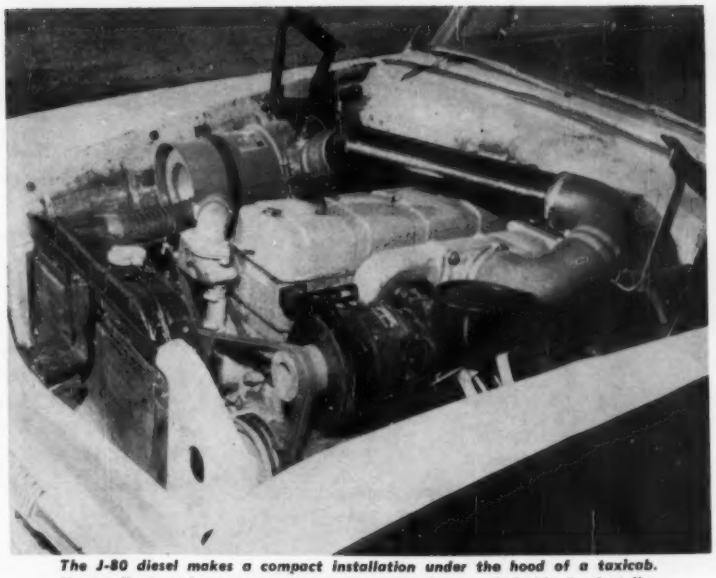
Air Cleaner—An oil-bath type air cleaner is used.

Electrical Equipment—The electrical system consists of a 12-v starting motor, a 30-amp generator, a voltage regulator and a key-type starting switch.

The lube oil cooler used only on the J-80 is of the tubular type and has an automatic by-pass valve. It is cooled by jacket water.

Horsepower and torque curves for both engines show the performance obtained when operating on No. 2 diesel or furnace oil. Equivalent results can be obtained with No. 1 or No. 3 fuels by a simple adjustment and recalibration of the fuel pump.

Curve No. 1 represents maximum bhp and torque corrected to conditions of 29.92-in. of mercury (sea level) barometric pressure, and 60°F intake air temperature. Unless otherwise specified, fuel pumps are set to deliver this power. This rating is suggested for use in off-highway trucks, scrapers, tractors, cranes, shovels and similar applications.



The J-80 diesel makes a compact installation under the hood of a taxicab. Its excellent performance and economy makes it very desirable for installations such as this and for other light vehicle and low-power applications.

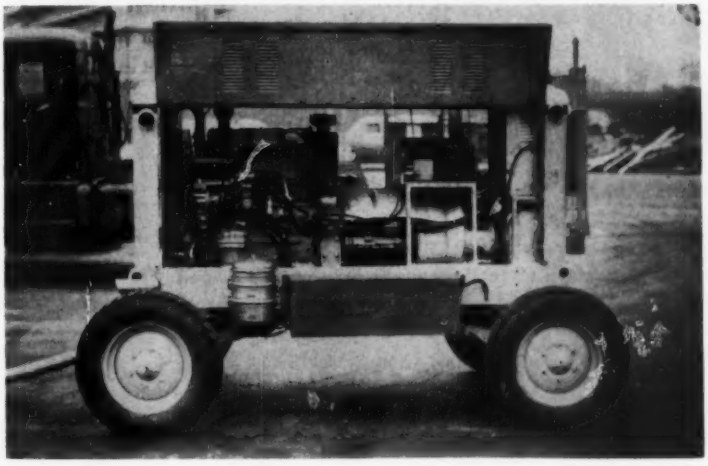
Curve No. 2 is a suggested rating for intermittent-duty applications such as sawmills, rock crushers, electric generator sets for standby or seasonal applications, or other applications in which full-load periods of operation are followed by equal periods of partial-load operation or shut-down.

Curve No. 3 is a rating suggested for continuous-duty service in which full power is required for long periods of time without equal intervals of operation at reduced loads or shut-down.

For altitude operation, maximum horsepower (curve No. 1) should be derated 3% for each 1000-ft rise. It should also be derated 1% for each 10°F air intake temperature above 60°F. Curves No. 2 and 3 should be derated 3% per 1000 ft above 5000 and 8300 ft respectively.

The performance of these units as indicated by these curves, plus economy of operation, low maintenance costs and reliability make an unbeatable combination which will give stiff competition to use of gasoline engines in the applications discussed.

Cummins J-80 drives Hobart generator set. This portable unit is only one of the many industrial applications for which this engine is suited.



industry news

Witte Gets 18th Safety Award

Dale Barnes, center, machine operator at Witte Engine Works of U. S. Steel's Oil Well Supply Div., receives the latest coveted prize in the long list of safety awards won by the Kansas City plant. The plaque is the first place no-lost-time accident award presented by the Metals Section of the National Safety Council at the council's recent annual congress in Chicago.

Shown with Barnes are K. O. Nilsson, left, Witte general manager, and M. D. Wood, plant superintendent.

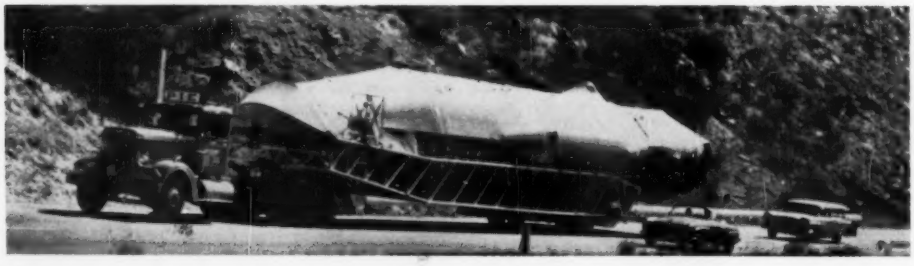
Since 1948, Witte Engine Works has received 17 safety awards, 10 are national awards and seven presented by the Kansas City Safety Council.

Over-The-Road Fleet Reduces Operating Costs

An "experiment" with diesel power in 1956 by O.K. Motor Service, Inc. proved to be the single most important profit-making action in the company's 37-year history according to its president, A. F. Cosentino.

Eighteen Cummins-powered Diamond T tractors including five powered by the recently-introduced 180 hp NH-180 engine make up this fleet. Each tractor makes three round trips every 24 hours. Tractors average 100,000 miles per unit per year.

Mr. Cosentino (left), shown with his Vice-President M. Aldrich, says, "Since switching to diesel, we have more than doubled our miles per gallon of fuel, cut the number of over-the-highway units by 62%, reduced $20,000 in parts inventory, and carry 6000 lb more per trip in payloads."



Diesel Tractor Tows Missile

A PIE diesel-powered tractor provided the "thrust" to carry this Atlas intercontinental ballistic missile to its test site. The Pacific Intermountain Express van picked up the missile stripped of its blast charge and exterior hardware at Convair's Astronautics Div. in San Diego. Fins and other equipment were carried in another van.

The van was 114 ft long, 16 ft wide and 15 ft, 6-in. high. For maneuvering around curves, two "tiller men" steered rear wheels which operated independently.

new products . Page 64

people and plants . . Page 68

new literature . . . . Page 74

AiResearch Turbo Production Tops 20,000

Over 20,000 diesel turbochargers have been made and delivered by the AiResearch Industrial Division of Garrett Corp. since it was formed in 1955. Their first air-cooled turbocharger was introduced commercially on the Cat D9 crawler tractor. Their turbocharger line for automotive, stationary and marine engine now covers a range from 50 to 750 hp for single unit installations.

A refinement of the turbocharger, a boost pressure controller which improves its performance, is also being manufactured along with a large variety of specialized industrial type valves.

Leonard Raymond To Head SAE in 1959

The Society of Automotive Engineers President for 1959 is Leonard Raymond. He is the chief automotive engineer—research of Socony Mobil Oil Co., N.Y. His job at Socony Mobil is to relate today's research to tomorrow's engineering requirements.

He has been prominent in SAE technical activities for many years and last year was chairman of its Publication Committee.

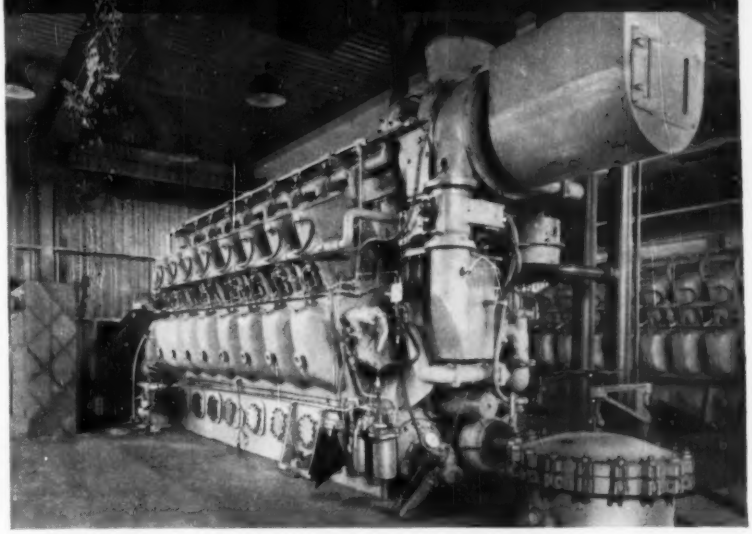
Other officers announced include: Treasurer—B. B. Bachman, director of engineering, Autocar Div., White Motor Co.

Vice President Representing Professional Activities: Diesel Engine—R. R. Robinson, assistant director of research, Caterpillar Tractor Co. Engineering Materials—C. F. Nixon, head, Electrochemistry Dept., Research Laboratories, General Motors Corp. Fuels and Lubricants—Lloyd Withrow, head, Fuels and Lubricants Dept., Research Laboratories, General Motors Corp. Tractor and Farm Machinery—F. P. Steiner, chief engineer, engine applications, International Harvester Co. Transportation and Maintenance—W. E. Thill, chief engineer, Federal-Mogul Service Div., Federal-Mogul-Bower Bearings, Inc. Truck and Bus—R. W. Wantin, manager, truck chassis and drive train engineering, Ford Div., Ford Motor Co.

THESE ENGINES EQUIPPED WITH

NUGENT FILTERS

have operated over 18 months without changing lube oil or filter cartridges



"These Alco 251 Diesels, equipped with Nugent Full-Flow Filters, have operated over 18 months without changing lube oil or filter cartridges."

This report from the Laton (Kansas) Pumping Station of Service Pipe Line Company is further positive proof of the dependability and economy of Nugent Filters.

The filters employed at Laton are Nugent's Fig. 1555 Laminated Fiber Disc Type. They filter all the lube oil in circulation every cycle before it goes to the bearings. Foreign particles as small as 2 or 3 microns are removed . . . oil is kept cleaner . . . oil life is actually extended.

The service life of your valuable equipment can be materially lengthened by providing the best filtering protection available. This is the business of the Nugent Co. Write for descriptive literature, today.

Nugent Fig. 1555 Filter Cartridges remove micronic size foreign solids.

ESTABLISHED 1897

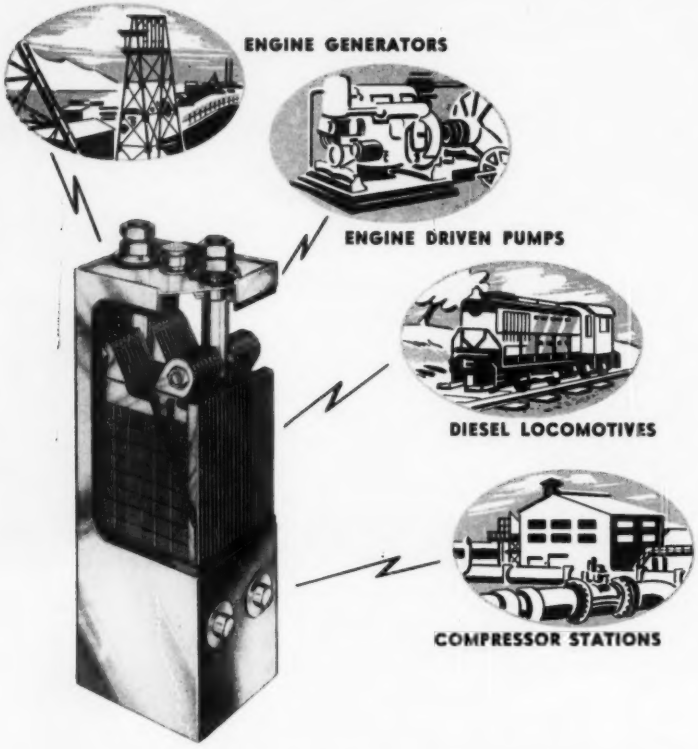
REPRESENTATIVES IN PRINCIPAL CITIES

WM. W. NUGENT & CO., INC.

3426 CLEVELAND STREET, SKOKIE, ILLINOIS

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

POSITIVE STARTING with NICAD STORAGE BATTERIES



Outstanding records of dependability and economy have been achieved by NICAD batteries.

They perform perennially "like new" . . . provide instantaneous power . . . operate virtually maintenance-free under extremely adverse conditions . . . withstand high ambients . . . *never* give off corrosive fumes . . . have excellent voltage regulation . . . will not deteriorate during extended periods of idleness.

Ask us for complete information on NICAD engine starting batteries. *NICAD Division, Gould-National Batteries, Inc.,* Easthampton, Mass. Offices in New York, Chicago, San Francisco.

NICAD **ALKALINE STORAGE BATTERIES**

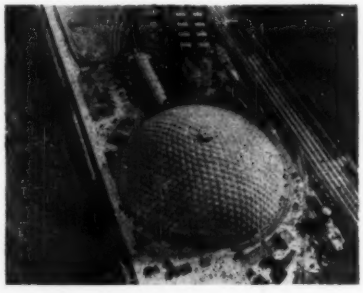
industry news

GM Diesel Forms Service Craftsman Guild

The Detroit Diesel Engine Div. of GM has formed a Diesel Service Craftsman Guild. All servicemen employed by GM's many distributors and dealers who are engaged in service work are eligible for qualifying examinations. Those proving their product knowledge by successfully completing the exam will be accepted into the Guild.

Exams will be given by service engineers from the six Detroit Diesel regional offices. Continued membership will be based on successful completion of six periodic exams pertaining to current product information released through service publications.

Membership will mean—annual attainment of 'earned' awards, employer and GM recognition for his efforts, incentive for self-improvement, pride in being a member of an efficiently-operated service team, and customer recognition of quality service by a Guild member wearing an identifying shoulder patch.



Tank Car Round-House

Is the railroad round-house on the way back? Workflow layout in Union Tank Car Company's dome structure has proven so successful in the work of rebuilding tank cars that the question comes up—will this principle be applied to locomotive units?

Among major advantages claimed for the circular layout in the 384-foot diameter, 10-story high Union Dome at Baton Rouge, La., are: (1) concentration of activity; (2) more efficient materials storage; (3) reduction in movements of men; (4) No idle repair spots; and (5) Improved supervisory control.

Diesel Specialists To Hold Hartford, Conn., Meeting

Members of the Association of Diesel Specialists will meet at the Statler-Hilton in Hartford, Conn., February 19-22, 1959. Specializing in sales and service of fuel injection equipment, governors and related equipment, members meet to discuss their industry problems and attend technical sessions.

Representatives of member firms from all parts of this country, Canada and Mexico, attend these meetings. The ADS was started a little over two years ago in response to a need for greater uniformity of practices and better technology in their industry. How well this has been done is attested by their current membership of 80 service and 12 manufacturing member firms.

These are open meetings with the exception of business meetings held on the last day. Those with special interest in the fields covered by the ADS are encouraged to attend. They'll see a progressive Association working for the betterment of their industry and thus, ultimately, for the good of users of such equipment.

P-I-E To Buy Union Transfer Co.

Hearing examiner of ICC has reaffirmed his prior position and again approved purchase by Pacific Intermountain Express of Union Transfer Co., doing business as Union Freightways of Omaha, Neb.

The order issued Nov. 10 will become effective Dec. 15. It was determined by the examiner that combining the two operations would result in a more efficient service. This would provide a single-line service between P-I-E points in the western states and those in Union's three-state territory.

Through the proposed transaction, P-I-E it will acquire 719 motor vehicles. Union Freightways maintains 20 company-operated terminals and 22 agency stations. Its 800 employees added to P-I-E will boost the total work force to nearly 5000.

Fram Packaging Assures Dust-Free Cartridges

New dust-proof polyethylene bags are now being used for packaging all diesel fuel oil filter cartridges made by the Fram Corp., Providence, R.I. It assures customers that Fram cartridges will be free of dust and contamination and in the same condition existing when they were first made.

Eaton-Fuller Unification

Fuller Mfg. Co. has become a wholly-owned subsidiary of Eaton Mfg. Co. The unifying transaction was a straight stock-for-stock exchange. Fuller will continue as a self-governing company within the Eaton organization, retaining its present organizational structure and company officers.

Several advantages will be realized by the merger according to E. L. Ludvigsen, Fuller president.

Eaton and Fuller can now offer axle-transmission options as a unit. Engineering progress will benefit from the experience of both companies. Manufacturers and operators have the advantage of being able to obtain efficient drive line options of proven quality, either as component parts or as complete units.

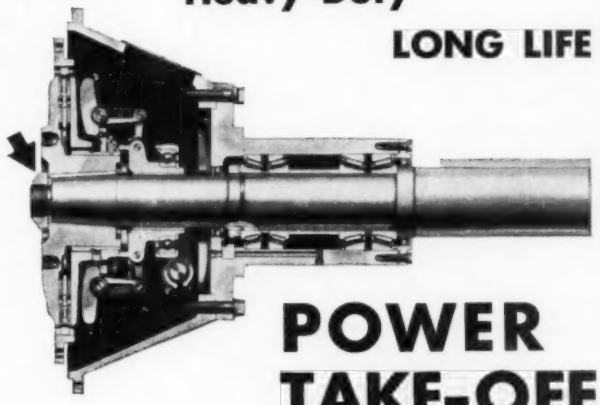
ROCKFORD

➡ Eliminates the Pilot Bearing in this

OIL FIELD TYPE

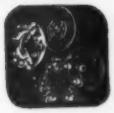
Heavy-Duty

LONG LIFE



POWER TAKE-OFF

Eighty five percent of all take-off failures that are caused by misalignment, lack of lubrication, overload and other reasons—stem from the pilot bearing. By eliminating the pilot bearing—in this new Oil Field type, long-life, extra heavy-duty power take-off—ROCKFORD has reduced down-time to a minimum. This improvement will help increase the trouble-free work-hours of your equipment.



Small Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

BW SEND FOR THIS HANDY BULLETIN

Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

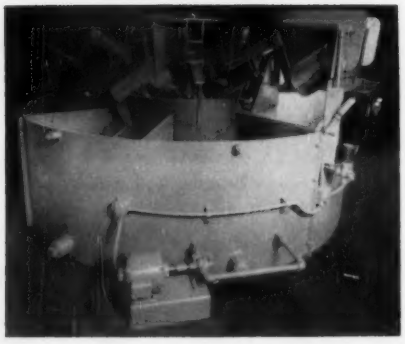
ROCKFORD Clutch Division BORG-WARNER

1301 Eighteenth Ave., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

new products



Automatic Phosphate Coating Machine Processes Pistons Fast

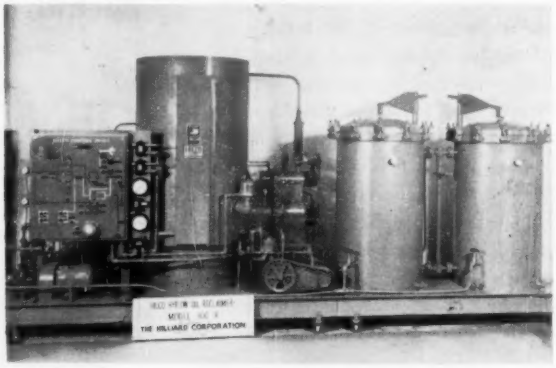
A machine made by Ranschoff, Inc., Hamilton, O., automatically phosphate-coats diesel pistons. Purpose is to permit rapid break-in without scoring or scuffing and to reduce subsequent wear.

Little space would be required in railroad and other service shops to treat reclaimed and reconditioned parts. The machine is 8 ft in diameter and 5 ft high. Time savings are realized in the processing cycle by the positive action of a pre-set time switch. One operator can load and unload the machine. One piston is processed every 4 minutes or a total of 15 per hour. The operator removes the piston from one of the fixtures after it has been processed and replaces it with another piston.

Full-Flow Lube Oil Reclaimer

Hilliard Corporation's new "Hilco Hyflow" oil reclaimer Model 300-X is designed for full-flow purification of lube oil at 224 gph. It consists of oil pumps, vacuum pumps, electrically-heated vacuum vaporizer, distillate tank and duplex Fullers earth filters.

A control panel operates all pumps and indicates heater operation, solenoid positions, tank levels and flow characteristics. Automatic recirculating features on the vaporizer permits dry oil only to be pumped from the reclaimer to the vacuum pump delivery system. Plus filtration, Fullers earth filters restore oil color and reduce acid in oil.



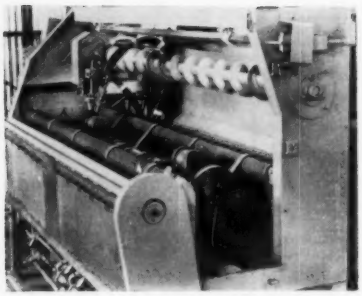
Spicer Presto-Matic Transmission

A semi-automatic transmission system has been announced by the Dana Corp. For the present, the new Presto-matic transmission will be available only in Diamond T trucks as a regular production option. It eliminates the clutch pedal in heavy-duty trucks. A touch-button control on top of the gearshift lever engages or disengages the clutch.

Engagement from a standing start is automatic due to a sensing mechanism which synchronizes clutch engagement with engine speed. The action duplicates the control of an expert driver using a pedal, effecting full engagement of the clutch as engine develops maximum torque.

The clutch is automatically disengaged when engine returns to idling speed. Combination of these two automatic actions permits inching along in heavy traffic without touching control or shifting gears.

The system retains fuel-saving characteristics of a clutch-type power train, provides effortless control and leaves selection of proper gear to the driver for greatest safety under all conditions.



Shot Peens Crankshafts To Increase Fatigue Strength

Added strength from shot peening has made crankshafts capable of carrying greater loads. Shot peening before plating of worn journals prevents the decrease in fatigue strength that may otherwise accompany chromium plating of steels.

PEENAMATIC Model 726, built by Metal Improvement Equipment Co., automatically shot peens crankshafts up to 16-in. diameter swing and up 7-ft long. No jigs or fixtures are used. The automatic peening cycle frees the operator except for setup, loading, and unloading.

The crankshaft is peened completely by two oscillating nozzles as they travel the length of the crankshaft for one round trip.

Fuel Oil Additive

More mileage per gallon, increased injector life, and reduction in shifting gears on grades are some of the claims made for "Power-Pal" diesel concentrates, a product of the Nutmeg Chemical Co., New Haven, Conn.

When added to fuel oil this compound is said to keep diesels free of carbon and sludge. The resulting cleaner combustion gives more efficient and economical operation, producing the results mentioned.

Power-Pal is also reported to disperse and emulsify water and give quicker starting.

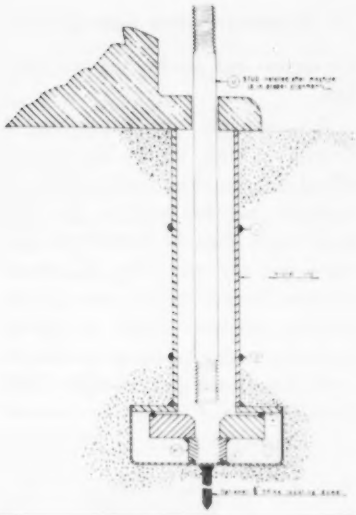
Recommended dosage is 4 fluid oz. per 100 gal of diesel fuel. Nutmeg Chemical Co. is offering a free sample, sufficient to treat 400 gals of fuel. Here's a chance to see what this additive can do for you.

Foundation Bolts For Heavy Equipment

The Stockman anchor plate for heavy stationary equipment is a positive method of anchorage in cement foundations. It can be installed in a cement foundation and still permit the foundation to be troweled to a smooth level finish without interference from protruding anchor bolts.

After plugs are removed from the riser pipe around the anchor plate and machinery is in place and in proper alignment, anchor studs can be inserted. The studs are screwed into threads in the anchor plate.

(*Continued on Page* 73)



NOTHING EQUALS THE ECCENTRIC METHOD OF VALVE SEAT GRINDING EXCLUSIVE WITH HALL TOLEDO

Designed Especially for Diesel Service!

Only Hall-Toledo's EDP Valve Seat Grinder can absolutely assure the finest performance results by providing perfect valve seating.

Whether you do your own valve work or have a diesel engine service organization handle it, be certain that HALL-TOLEDO equipment is used for faster, factory approved precision valve seat grinding. The MODEL EDP, especially designed for heavy duty diesel engines, will handle grinding wheels from 2" to 7" diameter. The Model EJ HALL-TOLEDO VALVE SEAT GRINDER is also available to precision grind smaller valve seats.

Write today *for information on the complete Hall-Toledo line for factory production or engine rebuilding work.*

HALL-TOLEDO, INC., 2031 SOUTH AVE., TOLEDO, OHIO

(*Continued from Page* 28)

for diesels and are finding new markets.

For example, the capability of providing high power in an unattended, automatic, self-contained package has tremendous potential application. Both the capacity of such units and the versatility of control systems have reached new levels. Taking one case, EMD is making headway in developing a market for such units in the electric utility field. Utilities have a need for low-cost peaking units of 5000 to 6000-kw capacity. EMD can give it to them in a portable 4-unit package—three engine-generator boxes and a control box. Announced installed costs do not exceed $100 per kw.

Capability of completely automatic operation of all sizes of engine presents new sales possibilities. Modern control systems add a new dimension to power application.

The small diesels are also finding wider application. Better performance, lower costs and higher specific outputs are making them more competitive with gasoline engines. In many instances they are replacing gasoline engines on a weight-for-weight, size-for-size and power-for-power basis.

One sleeper is the use of diesels in light commercial vehicles. The interest is there; it needs exploitation. Waukesha has a number of diesels in jeeps; Cummins, Cerlist, Hercules and probably others have engines in cabs and, of course, there are the Mercedes-Benz cars and Perkins conversions. Diesels are also being evaluated in light trucks.

Economic break-even points are moving down in the vehicular field. It was figured a truck had to do 80,000 to 90,000 miles per year to make a diesel pay out. Also, the diesel was thought only suitable for hard over-the-road service. Lower costs have now lowered the break-even to 30,000 to 40,000 miles per year and bus service and other work cycles of similar nature have shown the diesel capable of extended part-load and idle operation. Under these conditions, diesels *really* show economy when compared with gasoline engines. Also, this is the work cycle of most delivery trucks. Someone's going to exploit this field.

In the meantime, diesels are showing deeper penetration in existing fields. For example, more wheel-type farm tractors were built in the first eight months of 1958 than for the same period in 1957. And compared to 1957, 7% more of the total built were diesel-powered. Lift trucks and mechanical refrigeration of both railroad cars and trucks are two more areas of deeper penetration.

Better engines are reducing total cost of ownership and thus improving the diesel's competitive position. Cost per horsepower, fuel consumption and service life have all been favorably affected by recent technical and production developments.

Turbocharging, for example, has proven to be a relatively inexpensive way to get more horsepower. Its technology has been advancing steadily and many early operational difficulties have been eliminated. Acceptance of turbocharging is shown by a recent

FUEL INJECTION EQUIPMENT DIVISION OF
LUCAS ELECTRICAL SERVICES, INC.

Head Office: 501 West 42nd Street, New York 36
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Branch Offices: 643 7th Street, San Francisco, California
4937 West Belmont Avenue, Chicago 41, Illinois
400 South Edgewood Avenue, Jacksonville, Florida
Canadian Distributors:
Joseph Lucas (Canada) Ltd., *Head Office:* 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec

AP929

announcement of AirResearch to the effect that since their entry into the field in 1955 they have delivered over 20,000 units. Many small production-type units, suitable for a wide range of application, singly or in multiple, are now available.

Smart production men are finding ways to cut engine manufacturing costs, higher volume of certain parts through a greater degree of parts interchangeability is one method. Detroit Diesel has done this to a remarkable degree in their new line of engines. Hercules pioneered use of a common block for gasoline and diesel models in their GO and DD Series. Ford uses a high-production gasoline engine block for their tractor diesel and International Harvester recently introduced gasoline-diesel units with a high degree of parts interchangeability.

Fuel consumption is at a new low in engines of all sizes. Improvements in mechanical efficiency and improved combustion chamber design are largely responsible. Engine refinements that produce higher specific outputs turbocharging, aftercooling, design modifications for better breathing, etc.—have the added advantage of improving fuel economy since friction losses do not necessarily increase as horsepower goes up.

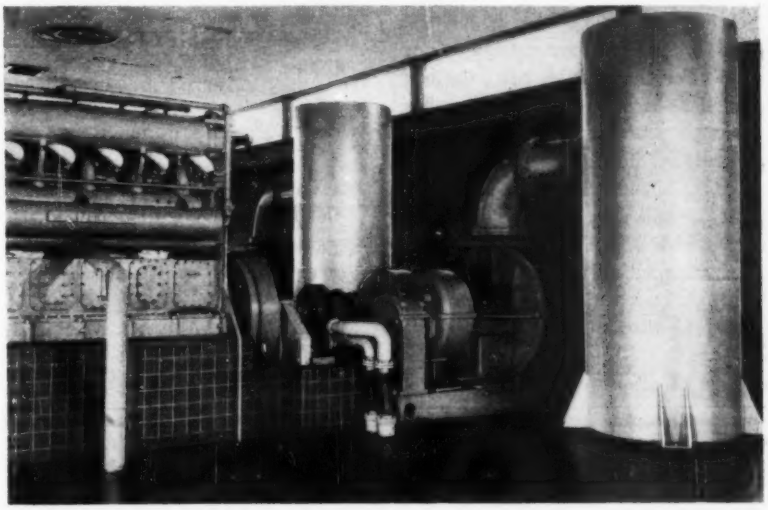
In automotive-size engines, there is a trend toward open-type combustion chambers with their potentially higher efficiency. Several current production engines show bsfc's below 0.40 lb per bhp hr in published curves. This used to be considered good for the best large-bore, low-speed engines. The larger engines have also improved their thermal efficiency but in general the spread in bsfc that used to exist between large and small engines is being narrowed.

Despite higher mechanical and thermal loadings, today's engines are demonstrating increased service life. Design, metallurgy, improved lubricants, better lube oil and air filtration—all contribute to this. Current operating records are showing daily that today's performance levels are being attained with a further bonus in extended operational life.

So all three factors—more competitive initial costs coupled with increased savings through better fuel economy and extended service life—combine to make an attractive package in today's power market.

Statistical sources as well as field contacts have shown that there has already been an upturn in engine sales. In making a projection for 1959 the question is whether this trend will be sustained and to what extent. To answer this we considered all the influences on the industry, both external and internal, with regards to each field of usage. This commentary includes some highlights of these influences.

As we see it, the trend will continue and to the extent shown in the tabulation. We see our industry as more vital and aggressive, more in tune with the times, with better products and better setups for selling them. This is a sound base on which to build a good sales year in 1959.



BLOWER WHISPERS WHILE IT WORKS . . . THANKS TO MAXIM SILENCERS

Intake suction . . . internal pulsations . . . discharge blast . . . are effectively quieted in this sewage plant's blower system by intake and discharge silencers built by Maxim. Blower noise level is actually below that of the engine.

For noise control that is right for your operations, consult Maxim. *New Maxim catalog is now available. Please mail coupon.*

THE MAXIM SILENCER COMPANY

Subsidiary of Emhart Manufacturing Company

93 HOMESTEAD AVENUE, HARTFORD, CONN.

THE MAXIM SILENCER COMPANY
Subsidiary of Emhart Manufacturing Company
93 HOMESTEAD AVENUE, HARTFORD, CONN.

Please send bulletins on silencers for:

☐ WASTE HEAT RECOVERY ☐ BLOWER INTAKES AND DISCHARGES
☐ INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE ☐ STEAM, AIR OR GAS DISCHARGES

NAME

COMPANY

ADDRESS

people and plants

H. R. Wilson

E. Roberts

Waukesha Promotions

Harvey R. Wilson has been named manager of the Waukesha Motor Co. Service Div. He has been with Waukesha's service organization since 1927. For the past 13 years, he has served as executive assistant service manager with supervision over all operational functions of the Service Dept. In his new post as service manager, he will direct all phases of the nation-wide Waukesha service organization activities.

Mr. Everett Roberts has been promoted to assistant service manager. For the past 13 years he has been in charge of all field service activities.

J. H. Flaskamper Joins Associated Engineers

John H. Flaskamper has been appointed vice president in charge of sales by Associated Engineers, Inc., Springfield, Mass. He will direct all sales functions of this organization.

Mr. Flaskamper, formerly vice president-sales for American Bosch Div. of the American Bosch Arma Corp., brings Associated Engineers a broad background in the sales field together with high administrative abilities.

Dana Corp. Elections

C. C. Dyvbig has been elected vice president, sales, of the Dana Corp., Toledo, Ohio. He will head the sales organization of this manufacturer of universal joints, axles and other products.

L. L. Dodge was elected vice president, administration, at the same time.

Newton B. Perkins

New Head For Barbour Stockwell Instruments Sales

Newton B. Perkins has been appointed national sales manager for Barbour Stockwell Instruments, Worcester, Mass. Barbour Stockwell Instruments was recently purchased by Curtis & Marble Machine Co. and is now one of its divisions. They manufacture the Reliance line of tachometers. Mileage recorders and other indicating, recording and transmission instruments for industry.

Schwitzer Addition

George C. Brainard, Jr. has been appointed assistant to the president of the Schwitzer Corp. His appointment became effective Nov. 1, 1958.

Standard Equipment on more diesel engines than any other make!

BENDIX STARTER DRIVES

Proved 125,000,000 times!

The long-time preference for Bendix* Starter Drives on diesel engines is based on hard facts such as these. It is simpler in design, it is more easily mounted—and in more positions. It requires no actuating linkage—therefore the solenoid can be placed in any convenient position. And it delivers performance, economy and durability far beyond any other drive. Whatever your type of diesel, it'll start *better* with a Bendix drive. *REG. U. S. PAT. OFF.

Bendix-Elmira
Eclipse Machine Division
Elmira, New York

Bendix
AVIATION CORPORATION

REDUCE LAPPING TIME
TO A *Minimum*
ON

Diesel Injector and Compressor Parts

LAPMASTER Model 10

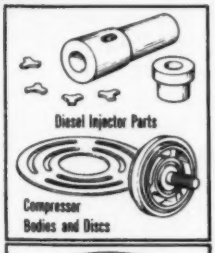
Consistently laps to flatness within .0000116" and finishes of 2 to 3 RMS.

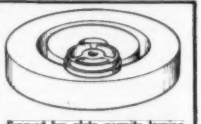
No down time for truing lap plate . . . conditioning rings automatically keep plate flat and true.

Handles parts up to 7" dia. . . . . any shape or form . . . any metal, ceramics or plastic.

Automatically controlled lapping cycle.

Write for latest Lapmaster Bulletins





Grooved lap plate permits lapping of compressor bodies without removing stud.

CRANE PACKING COMPANY
6448 Oakton Street, Morton Grove, Illinois, *(Chicago Suburb)*
In Canada: Crane Packing Co., Ltd., Hamilton, Ont.

KIENE®

MODEL K-120

universal peak firing and compression pressure indicator

The Model K-120 is the only maximum pressure indicator that can be used as a compression tester on small, high-speed engines and as a firing pressure indicator on engines having indicator valves. Patented Kiene diaphragm type check valve of stainless steel has no springs or piston, no complicated adjustments, temperature corrections or pressure loss. Bleeder valve permits release of indicator pressure for repeat readings. This instrument gives true pressure readings with an uncompensated gage.

Adaptors for most models U.S.A. engines. Others made to order at reasonable prices.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE. FRANKLIN PARK, ILLINOIS

New Director of Engineering at Briggs

James M. Canaris is now director of engineering of The Briggs Filtration Co., Washington, D.C. He has been a member of the Briggs sales-engineering staff since 1956.

His new duties will involve close contact with commercial, industrial and governmental sources, especially in connection with the rapidly expanding jet fueling program of The Briggs Filtration Co.

New Ass't Sales Mgr. At IH

Willard F. Hall has been named assistant sales manager of International Harvester's Construction Equipment Div. Hall had been Central Region sales manager of the division for the last three years. He began his IH service at the Minneapolis district office in 1939.

After holding many responsible positions in various IH branches, he was appointed assistant central regional sales manager for construction equipment, becoming manager of that region in 1955.

Ernest H. Schanzlin

New Chief Engineer At Tuthill

Ernest H. Schanzlin has joined the Tuthill Co. as chief engineer. He will direct all of Tuthill's research and engineering activities.

Mr. Schanzlin, was formerly Assistant to the Director of Engineering, Pesco Products Div., Borg Warner Corp.

NICAD Engineering Staff Appointment

The NICAD Div. of Gould-National Batteries, Inc., Easthampton, Mass., has announced the appointmen of Fayette C. Anderson to their engineering staff.

Mr. Anderson was formerly chief engineer for the Storage Battery Div. of Thomas A. Edison Industries.

Chief Application Engineer At Air-Maze

Ned Lamprecht has been appointed as chief application engineer by The Air-Maze Corp., Cleveland, Ohio. He will be responsible for coordinating the company's engineering and sales facilities for applying air and liquid filters to all types of industrial products.

Mr. Lamprecht joined Air-Maze in 1946. In 1957, he became sales manager of the A. A. Straub Co. of Cleveland and held that position until recently re-joining Air-Maze.

Fram Acquires Donaldson Co. Stock

The Fram Corp., Providence, R.I., has acquired all of the outstanding stock of the Donaldson Co. (Canada) Ltd., a subsidiary of the Donaldson Co. of St. Paul, Minn. The Donaldson Co. Ltd., makes air filters and has complete stamping facilities.

This new acquisition will enable Fram to supply the Canadian market as it presently does in the U.S.

people and plants

S. L. Fry

Blackmer Sales Manager

Scovell L. Fry is now Central Div. manager of the Blackmer Pump Co., Grand Rapids, Mich. He will be in charge of Blackmer's Div. Office in Chicago which serves an area covering North and South Dakota, Nebraska, Iowa, Minnesota, Wisconsin, Illinois, Indiana, and parts of Missouri and Kentucky.

Dallas Firm Adds Filter Line

The Ray Co., Dallas, Tex., has acquired a sales agreement with American Air Filter Co., Inc., Louisville, Ky., to market AAF's line of air filter products. This line formerly was represented by Gilbert Engineering Co., also of Dallas.

W. C. Cheney

Gillett & Eaton Elects President

Wendell C. Cheney has been elected president of Gillett & Eaton, Inc., Lake City, Minn. and its subsidiaries. This took place after financial details of the sale of the company to Gould-National Batteries, Inc. were completed. Mr. Cheney was also elected to the board of directors of Gould-National Batteries, Inc., St. Paul and to the board of White Machine Works, Eau Claire, Wis.

Mr. Cheney has been vice president and treasurer of Gillett & Eaton, Inc. since 1943. He has nearly 35 years' experience in the piston business. When he came to Gillett & Eaton in 1939, his first assignment was to establish the manufacturing division for finishing pistons.

Promotions At De Laval

C. E. Cromwell has been appointed manager of commercial sales by the De Laval Steam Turbine Co., Trenton, N. J. He will be responsible for sales activities of commercial products including pumps, centrifugal compressors, turbines, and commercial gears. He will also continue as field sales manager.

A. L. Foltz, Jr., manager of the Detroit district office since 1953, has been appointed manager of the Chicago district office.

J. F. Donovan, a sales engineer for the past nine years, in the Detroit and Kansas City Offices, has been appointed manager of the Detroit District Office.

W. H. Mouquin, former manager of the Chicago District Office is now manager of the newly established New York District Office.

New Nutmeg Chemical Division

F. Geisinger, president of Nutmeg Chemical Co., New Haven, Conn., has announced formation of the Motive Specialties Div. The new divi-

FREE to Every Shop Operator

- Diesel Compression Testers
- Nozzle Testers for American Bosch, Caterpillar and Bendix Nozzles
- Cummins Injector Tester
- International Harvester Injection Testers
- General Motors Injector Testers
- Injection Pump Calibrating Stands
- Nozzle-Injector Cleaning Tools and Lapping Blocks
- Engine Overhaul Stands
- Engine Removal and Parts Dollies
- GM 71 Engine Tools

76 Pages—275 Illustrations
56 Engine Reference Tables
26 Parts Lists

SEND COUPON NOW

BACHARACH INDUSTRIAL INSTR. CO. • 200 N. BRADDOCK AVE., PGH. 8, PA.

Send us FREE copy of your Diesel Shop Manual AD54

We are: ☐ Fleet Operators ☐ Injection Service Shop ☐ Diesel Manufacturers ☐ Parts and Engine Distributors

NAME_____

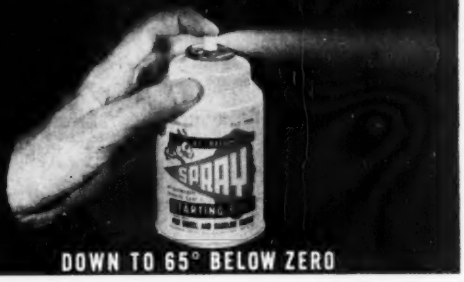
COMPANY_____

STREET_____

CITY and STATE_____

AD-15

QUICK STARTS FOR COLD ENGINES* ALL YEAR . . .



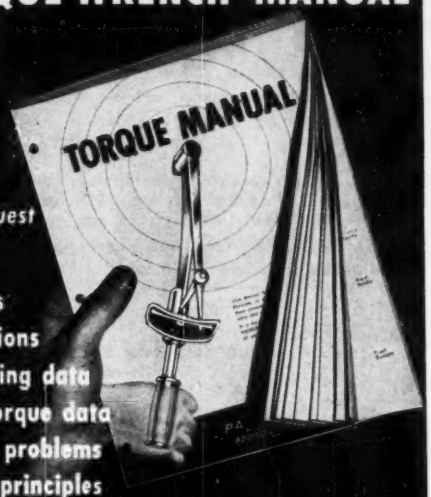
Starting a cold engine without SPRAY STARTING FLUID is costly. Constant wear of the starting system . . . wasted man hours . . . equipment down-time . . . repeated engine strain, can be prevented with a pressurized can of SPRAY STARTING FLUID. It's so easy to use! Apply SPRAY STARTING FLUID into the air cleaner or intake air stream while cranking the engine. Continue spraying until the engine runs smoothly. Use SPRAY STARTING FLUID regularly for quick, easy and economical starting of diesel and gasoline engines. Start every work day with SPRAY!

*Until the engine reaches normal operating temperature it is a cold engine.

SPRAY PRODUCTS CORPORATION

P. O. Box 844 • Camden 1, New Jersey

"TORQUE WRENCH" MANUAL

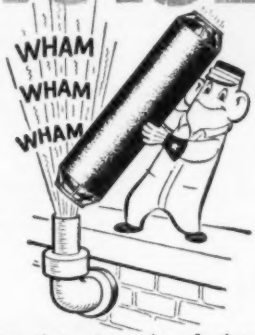


Sent upon request

Formulas
Applications
Engineering data
Screw torque data
Adapter problems
General principles

P.A. STURTEVANT CO.
ADDISON QUALITY® ILLINOIS
Manufacturers of over 85% of the torque wrenches used in industry

STOP THAT NOISE!
from Air, Steam and other gas discharges
with
BURGESS-MANNING SNUBBERS



Stop that noise and profit through better neighbor and employee relations. Avoid compensation claims.

Burgess-Manning Snubbers are engineered to effectively correct your specific noise problem.

From a WHAM

Sound Engineering
BURGESS-MANNING COMPANY
9209 Sovereign Row, Dallas 35, Texas
Libertyville, Illinois

sion will make and market diesel fuel conditioners and affiliated products.

Mr. S. Gailzaid has been named sales mgr. of the new division, W. J. Hall is assistant sales mgr.

W. Clausen Heads Aluminum Industries

William Clausen is the new President of Aluminum Industries, Inc., Cincinnati, Ohio. He succeeds H. O. Ash, who is now chairman of the board. Mr. Clausen was also elected to the board.

Aluminum Industries, Inc., is a leading manufacturer of aluminum pistons, valve seat inserts and other engine and chassis parts, all under the name of Permite Preferred parts.

Curtis & Marble Buys Instrument Div. Of Barbour Stockwell

Purchase of assets of the Instrument Div. of the Barbour Stockwell Co. of Cambridge, Mass. has been announced by Curtis & Marble Machine Co., Worcester, Mass. This new operation will be designated as Barbour Stockwell Instruments. It will operate as a separate division of Curtis & Marble.

Stanley Engineering Co. Changes

Stanley Engineering Co., consulting engineers have announced that S. K. Fosholt, a partner in the Company, is assuming supervision of their Report, Design, Construction and Office Groups.

B. L. Sturdevant is now head of the Design Group, succeeding Mr. Fosholt.

W. R. Sheldon has been designated head of the Building & Industrial Dept. in the Design Group.

M. W. Sedgley has become head of the Civil Dept. of the Design Group.

Mr. T. D. Wenger has been appointed head of the Power Dept. of the Design Group.

Cooper-Bessemer Appointments

The appointment of William J. Burkstaller and Gilbreth D. Adams to the Cooper-Bessemer New Orleans field office has been announced.

Formerly associated with the C-B Odessa office, Mr. Burkstaller assumes the duties of sales engineer for the application of compressors in the New Orleans area.

In his new capacity, Mr. Adams will assist in engineering and sales relative to the application of centrifugal and reciprocating compressors in the Louisiana area. He has been with C-B since 1956 working in its headquarters engineering department at Mount Vernon, Ohio.

Alco Forms New Field Marketing Organization

Alco Products, Inc. have revamped its field marketing organization. Under the new setup, sales managers have been established for the company's three major product divisions. This will provide the company with more specialized sales direction and selling effort in the field.

R. W. Pittman is appointed sales manager for transportation products and services; P. W. Geisler is now sales manager for the thermal and petroleum industry equipment divisions and R. H. Binkerd is named sales manager, industrial equipment, spring and forge division. All will report to A. T. Lawrence, general field sales manager for the company.

LOOK for this Seal of the ASSOCIATION of DIESEL SPECIALISTS when you need Specialized Service for your engines.

identifies Qualified ADS Members
symbolizes Know-How—Modern Facilities—Ethics
guarantees work performed by Factory-Trained Technicians using Factory-Approved Methods with Best Materials

Listings below are available to ADS Service Members desiring to participate in this Directory. Code letters in each listing indicate the Specialized Sales and Services offered by each Member Shop. Code symbols are below.

F—Fuel Injection Equip. A—Engine Accessories & Specialties C—Engine Components & Parts
G—Governors T—Specialized Tooling & Test Equip. E—Electrical Equipment

ALABAMA

DIESEL FUEL INJECTION SERVICE
365 N. Royal Street
F A C Mobile, Alabama
G T E Tel: HE 2-7513

ARIZONA

PERKINS DIESEL SERVICE
747 South Country Club Drive
F A C Mesa, Arizona
G T E Tel: WOodland 4-5273

CALIFORNIA

McKINLEY CORPORATION
2196 Palou Avenue
F A G San Francisco 24, California
T E Tel: MI 8-1665

DIESEL CONTROL CORPORATION
226 No. Marine Avenue
F A C Wilmington, California
G T Tel: TErminal 4-8516

CONNECTICUT

W. J. CONNELL CO. OF HARTFORD
85 Airport Road
F A G Hartford 14, Conn.
T E Tel: JA 5-3401

CLARK-SON CO., INC.
354 Davenport Avenue
F A C New Haven, Conn.
G T E Tel: STate 7-4152

FLORIDA

DADE DIESEL COMPANY
2717 N.W. 54th Street
F A C Miami 42, Florida
G T Tel: NEwton 4-3063

FLORIDA DIESEL & ELECTRIC CO.
1930 No. Miami Avenue
F A G Miami 32, Florida
T E Tel: FRanklin 1-7691

GEORGIA

AUTO ELECTRIC & MAGNETO COMPANY
477 Spring Street N.W.
F A G Atlanta 8, Georgia
T E Tel: JAckson 3-5831

ILLINOIS

ILLINOIS AUTO ELECTRIC CO.
2011-37 Indiana Ave.
F A C Chicago 16, Ill.
G T E Tel: CA 5-4444

KENTUCKY

DIESEL INJECTION SERVICE CO.
805 Mulberry St.
F A C Louisville 17, Ky.
G T E Tel: MElrose 5-7731

LOUISIANA

WOMACK BROTHERS DIESEL SERVICE
3983 Airline Highway
F A C Baton Rouge, Louisiana
G T E Tel: ELgin 7-9666

VAUGHAN & BUSH, INC.
605 West First Street
F Bossier City, La.
Tel: 5-7404

GERHARDT'S INC.
1917 Jefferson Highway
F A G New Orleans 21, La.
T Tel: VErnon 3-7254

JOHN M. WALTON, INC.
1050 Carondelet Street
F A C New Orleans 13, La.
G T E Tel: JAckson 5-0556

MAINE

EASTERN DIESEL SERVICE COMPANY
997 Congress Street
F A G Portland, Maine
Tel: SPruce 3-1082

MARYLAND

MECHANICAL EQUIPMENT CO.
2140 Hartford Road
F A G Baltimore 18, Md.
T Tel: Tux 9-7607

PARKS & HULL AUTOMOTIVE CORP.
1033 Cathedral Street
F A G Baltimore 1, Md.
T E Tel: SA 7-8383

MASSACHUSETTS

BOSTON FUEL INJECTION & ENGINE SERVICE CO., INC.
263 Northern Avenue
F A G Boston, Mass.
T Tel: Liberty 2-6646

W. J. CONNELL COMPANY
210 Needham Street
F A G N. Upper Falls 64, Mass.
T E Tel: DEcatur 2-3630

C. A. KROHNE & SONS
833 Columbus Avenue
F A C Springfield 5, Mass.
G T E Tel: RE 2-7441

MICHIGAN

KNORR-MAYNARD COMPANY
5743 Woodward Avenue
F A T Detroit 2, Michigan
E Tel: TRinity 2-2200

MINNESOTA

DIESEL SERVICE COMPANY
1800 3rd Avenue E.
F A C Hibbing, Minn.
G T E Tel: AMherst 3-5725

DIESEL SERVICE COMPANY
2509 East Lake Street
F A C Minneapolis 6, Minn.
G T E Tel: PArkway 1-5065

MISSISSIPPI

WOMACK BROTHERS DIESEL SERVICE
1321 So. Gallatin St.
F A C Jackson, Mississippi
G T E Tel: FLeetwood 5-3439

MISSOURI

DIESEL FUEL INJECTION SERVICE, INC
9331 So. Broadway
F A G St. Louis 25, Mo.
T Tel: VErnon 2-2121

NEW YORK

A & D DIESEL SERVICE, INC.
145 — 21st Street
F A G Brooklyn 32, New York
T E Tel: STerling 8-4222

HETTRICH ELECTRIC SERVICE, INC.
1032 Elliott Street
F A C Buffalo 9, New York
G T E Tel: GRant 7602

NORTH CAROLINA

DIESEL INJECTION SALES & SERVICE
1625 North Tryon Street
F A C Charlotte, N. C.
G T Tel: FRanklin 5-4152

SANDERS DIESEL INJECTION & HYDRAULIC SERVICE
122 Atando Avenue
F A G Charlotte 6, N.C.
T Tel: ED 4-8225

DIESEL INJECTION SALES & SERVICE
3015 Hillsboro St.
F A C Raleigh, N. C.
T G E Tel: TE 4-5553 TE 4-2316

ASSOCIATION of DIESEL SPECIALISTS, INC.

For information contact:
S. E. Franklin, Secretary, P. O. Box 1116, Wilmington, Calif.
Next Meeting—Statler Hotel, Hartford, Conn., Feb 19-22, 1959.

NORTH DAKOTA

MIDLAN.. DIESEL SERVICE & ENGINE CO.
25 — 28th St. S.W.
F T Fargo, North Dakota
Tel: ADams 2-5578

DIESEL SERVICE COMPANY
Highway 83 South
F A C Minot, North Dakota
G T E Tel: 6-8219

OKLAHOMA

AMERICAN ELECTRIC IGNITION CO.
124 N.W. Eighth Street
F A C Oklahoma City, Oklahoma
G T E Tel: FOrest 5-6494

OREGON

AUTOMOTIVE PRODUCTS, INC.
1700 S.E. Grand Avenue
F A G Portland 14, Oregon
T E Tel: BElmont 4-5241

PENNSYLVANIA

PENN DIESEL SERVICE CO.
100 Prince St.
F A G Harrisburg, Penna.
T Tel: KI 5-8530

PENN DIESEL SERVICE CO.
27th & North Church Streets, RD#1.
F A C Hazleton, Pa.
G T Tel: GL 4-6771

GENGLER'S DIESEL SERVICE & SALES
2nd & Orange Street
F A C Mount Carmel, Pa.
G T E Tel: 1261 & 1262

PHILADELPHIA DIESEL, INC.
2520 Orthodox Street
F A C Philadelphia 37, Pa.
G T E Tel: Pioneer 3-3773

TENNESSEE

BARNES-RHODES COMPANY
401 Chestnut Street
F A G Chattanooga 2, Tennessee
T E Tel: AM 7-6752

TEXAS

MAGNETO & DIESEL INJECTOR SERVICE
1801 Lexington Boulevard
F A T Corpus Christi, Texas
E Tel: TU 2-8662

MAGNETO & DIESEL INJECTOR SERVICE
6931 Navigation Blvd.
F A T Houston 11, Texas
E Tel: WA 1-4830

WOMACK BROTHERS DIESEL SERVICE
123 West Carolina St.
F A C San Antonio, Texas
G T E Tel: LE 2-1182, LE 4-5445

VIRGINIA

DIESEL INJECTION SALES & SERVICE, INC.
808 Union St.
F A C Norfolk 10, Va.
T G E Tel: MAdison 2-3103

DIESEL INJECTION SALES & SERVICE, INC.
910 North Boulevard
F A C Richmond, Va.
G T Tel: EL 8-8170

DIESEL INJECTION SALES & SERVICE, INC.
1016 Delaware Street
F A C Salem, Virginia
T G E Tel: DU 9-7296 & DU 9-7297

WASHINGTON

SEATTLE INJECTOR & ELECTRIC CO.
2706 2nd Avenue
F A C Seattle 1, Washington
G T E Tel: MA 3-1135

WISCONSIN

FUEL INJECTION & ELECTRIC, INC.
932 No. Jackson St.
F A G Milwaukee 2, Wisconsin
T E Tel: BRoadway 2-0818

ALASKA

VAN'S DIESEL SERVICE
119 Second St.
F A C Juneau, Alaska
E Tel: 6-1670

MANUFACTURING MEMBERS

ADECO PRODUCTS, INC.
5435 No. Wolcott Ave.
Chicago 40, Illinois

AMERICAN BOSCH CORPORATION
3664 Main Street
Springfield 7, Massachusetts

C.A.V. LIMITED
14820 Detroit Avenue
Cleveland 7, Ohio

FARRIS PICKERING GOVERNOR COMPANY, INC.
400 Commercial Ave.
Palisades Park, New Jersey

HARTFORD MACHINE SCREW CO.
Hartford 2, Connecticut

KERMATH ENGINE WORKS, INC.
12822 Simms Avenue
Hawthorne, California

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois

MARINE PUMPS, INC.
Spiralap and Unitest Division
Wilmington, California

PIERCE GOVERNOR COMPANY
Anderson, Indiana

ROBERT BOSCH CORPORATION
40-25 Crescent Street
Long Island City 1, New York

SCINTILLA DIVISION
Bendix Aviation Corporation
Sidney, New York

START PILOT CORPORATION
Mineola, New York

WOODWARD GOVERNOR COMPANY
Rockford, Illinois

ACCREDITED DEPENDABLE SERVICE Member A.D.S

new products

(*Continued from Page 65*)

Koppers Adds Two Forged Steel Couplings to Line

The Metal Products Div. of Koppers Co., Inc., Baltimore, Md., now makes a newly-designed forged steel coupling in sizes #5½ and #6. These are said to be stronger and lighter than cast steel couplings used in most of the same applications. The new couplings are offered at a lower cost than the cast steel.

The two new sizes have been added to the Fast's forged steel line. Previously, this was available only in sizes #1½ to #5. Koppers expects the new forged steel couplings to eventually replace the cast steel in most applications.

Literature on the new forged steel couplings can be obtained.

New Underground Mining Truck

Western Machinery and Engine Co. of St. Louis is offering the mining industry a new underground mine truck—the Oremaster. It has been developed to permit operators of trackless haulage mines to use rubber-tired equipment in low-headroom and narrow-drift areas.

Having three speeds in either direction the GM diesel-powered Oremaster can work the heading without turning around. Backing into the heading is an easy matter due to the high maneuverability of the unit.

Travel time is materially stepped up between loading points by the GM diesel and the Allison CRT 3331-3 Torqmatic Transmission.

Because of its Allison drive, all gear changes can be made under full-torque conditions and full throttle.

Protective Oil Coating

An efficient method for treating metal friction parts with a protective oil-absorbent coating is provided in the newly developed Duralube processing unit. It is designed for use in treating metal parts, including camshafts, pistons, valve tappets, piston rings gears, bearing races, etc. benefitted by lubricant impregnation, parkerizing or bonderizing.

new literature

Twin Disc Magazine

"Production Road", a magazine published quarterly by the Twin Disc Clutch Co., is available to those interested in friction clutches, power take-offs, fluid couplings, torque converters and marine gears.

The latest issue, for example, covers the history of engine-powered machinery on land and sea since 1918, the year of Twin Disc's founding. Special attention is given to the development of the many Twin Disc products.

Other stories cover pipeline, oil well, machine tool, construction and logging installations.

Nicad Bulletin

Nicad Bulletin 200 assists architects and engineers in their selection of heavy-duty nickel cadmium storage batteries for industrial engine starting and stand-by power applications. It provides detailed selection data on batteries designed for starting diesels, supervisory control, emergency lighting, and switch tripping.

Operation and construction descriptions explain why they give long term, reliable service at low annual cost. Diagrams show installation methods in space conserving rack arrangements.

Fulflo Filters for Compressed Air

The complete line of Fulflo Filters for compressed air and other gases is covered in a new booklet. This Commercial Filters Corp. booklet describes several single-tube models for operating pressures 125 to 4000 psi, and flow rates as high as 800 scfm. Multi-tube models, with as many as 270 honeycomb filter tubes, are designed for high flow rates.

The booklet also includes technical information and chart on flow characteristics, physical dimensions, and filter metals.

New Techniques Simplify Assembly

New techniques for retaining antifriction bearings with Loctite Sealant are described in a brochure by the American Sealants Co. Loctite sealant is a thin liquid plastic that hardens without shrinkage when confined between closely fitting metal parts. It eliminates need for interference fits on bearings, sleeves, shafts and studs, locks nuts to bolts and seals piping and tubing joints.

The brochure also contains latest information on how to stop breakdowns due to loose nuts and bolts by using the "liquid lockwasher" and how to seal joints against high fluid pressures.

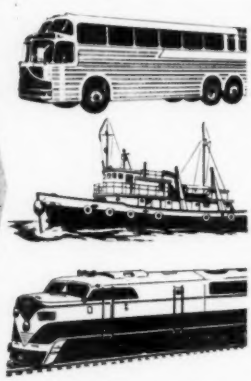
Case histories describe how assembly is simplified with Loctite. Properties and methods of application are described and grade selector charts and usage tables for calculation of costs and savings are given.

ARE YOUR DIESELS BEING CLEANED IN *quickest* TIME AT *lowest cost?*

BETTER SWITCH TO

LIX

DIESEL CLEANERS!



You'll like what LIX does for your diesels! Cleaning time shortened to the minimum . . . costs cut 'way down! Lix soaks away all grease, grime and caked carbon from torque converters, transmissions, fuel injector nozzles, and other parts—no brushing or scraping at all.

Lix Diesel Cleaners are **harmless** to all metals including aluminum and brass. **Safer,** too—are of low toxicity, not a fire hazard. And **longer life** without frequent charges.

There's a Lix Cleaner for any diesel cleaning job: **spray** or **soak** tank types, **electric equipment** cleaners . . . **NON-CHLORINATED.**

Write or telephone for literature covering your particular needs.

THE Lix CORPORATION (OF MISSOURI)

"Leadership in Industrial Cleaning"

300 West 80th St.-Dept. D3
Kansas City, Missouri

Amazing new LIX CARBURETOR CLEANER cleans carburetors FAST, SAFELY! Parts come out looking like **new!**

AVIEX STARTING FLUID

Contractor's Endorsement

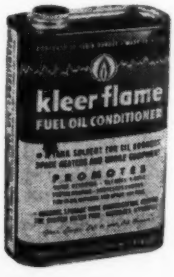
"We have used all of the best known starting fluids and have found that Aviex Starting Fluid has eliminated our starting troubles and reduced our maintenance costs. We now use Aviex 12 months a year."

Clayton McCoy, Inc.
Niles, Michigan

—Provides more effective starts per can at sub zero temperatures.

—Sprays 100% pure Ethyl Ether at any temperature which might be encountered in world travel without warming the can before spraying.

—Contains a new type of propellant that does not mix with the starting fluid and will not liquify in cold weather.



KLEER FLAME—
Diesel fuel oil conditioner prevents clogging:

—fuel pump filters
—injection nozzles

Recommended and approved by Nine Diesel Equipment Manufacturers

UNITED STATES AVIEX COMPANY
423 N. 9th St., Niles, Michigan

OGP 1957 Power Cost Report Available

The "1957 Report on Oil and Gas Engine Power Costs" just issued by the American Society of Mechanical Engineers lists detailed data for 1956 and previous years.

Published annually by the Oil and Gas Power Division, ASME this report is invaluable as a cost and performance guide to all concerned with power application. The report is unique in the power industry, being the only factual, objective compilation of actual power costs.

It contains operating cost data from 104 plants. Response from operators of dual-fuel and gas-engine plants has increased to the extent that this report includes 49 plants with a total of 142 dual-fuel engines and 19 gas-engine plants with a total of 65 gas engines.

This report presents information on performance and production cost of oil and gas-engine power plants. Production cost, as relating to plants, is defined as consisting of the following items: fuel cost; lubrication cost; cost of attendance and superintendence; cost of supplies and miscellaneous; cost of engine and all other plant repairs.

This report can be obtained for $3.00 with 20% discount to ASME members. Quantity discounts are also provided. They can be obtained from the ASME at 29 W. 39th St., New York 18, N. Y.

Precision Shaft Seals

Borg-Warner Mechanical Seals, a division of the Borg-Warner Corp. has just published a new, 4-page bulletin describing their line of precision shaft seals. Ranges for standard types are given, and engineered models offered for other applications.

Lightweight Coupling Data

A 4-page folder detailing their new "Nyflex" flexible gear coupling with a nylon sleeve has been released by Sier-Bath Gear & Pump Co., Inc., Coupling Div. The folder gives descriptive data on the new, lightweight coupling and includes tabular data covering horsepower, speed ranges and bore sizes available.

Kittell Silencers

Silencers for engine exhausts, compressor intakes, blower intakes and exhausts, and vacuum pump intakes are covered in detail in the 26-page booklet issued by Kittell Muffler & Engineering Co. Construction, application and installation of various types of silencers, spark arrestors and weather mufflers are illustrated and described. Selection charts and price list are given plus complete dimensions and weights.

The following types are covered: (1) engine exhaust, blower and positive-type vacuum pump silencers for industrial areas, for all but the most critical installations, and for zones where no noise can be tolerated; (2) spark arrestors for mobile equipment, for engine exhausts in hazardous locations, and for engine exhausts in hazardous locations where spark arresting is necessary along with good silencing; and (3) weather mufflers for mobile equipment to prevent rain from entering exhaust stack and also to provide moderate silencing.

Gould "Silconic" Battery Plate

The Industrial Division of Gould-National Batteries, Inc., has issued a new bulletin (GB-1876) on the "Silconic" battery plate now available in all Gould motive-power batteries.

The 4-page bulletin describes the patented Gould process for introducing arsenic and silver cobalt sulphates into the active materials of positive plates which produces industrial storage batteries having 10 to 25% longer life and improved electrical characteristics.

Kato A-C Generators

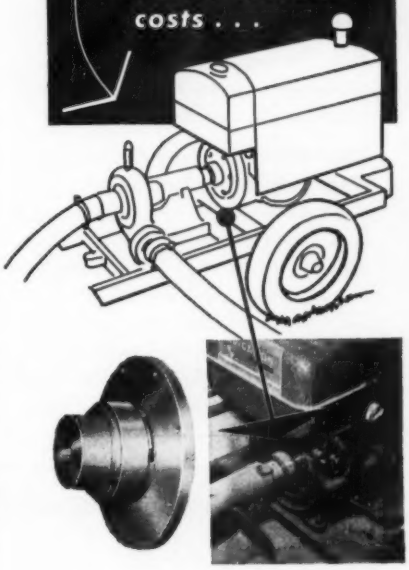
Kato Engineering Company's latest product bulletin Form ACG958 is now available. It covers the construction, sizes, performance, and other features of Kato generators. Emphasis is placed on their newly-developed complete line of brushless alternators.

Instruction manuals and descriptive sheets are also available on Kato's new static exciter magnetic amplifier voltage regulator units.

MAINTENANCE-FREE YEAR AFTER YEAR

Flywheel-to-Pump Coupling

saves space, installation time and equipment costs . . .



The Lovejoy Type CF Coupling is completely maintenance-free, requires no lubrication and will deliver top performance year after year regardless of dust, dirt, mud or water. Especially designed to bolt directly to the flywheel, it eliminates the stub shaft and provides a simplified and compact engine to pump drive.

Equipment manufacturers, users and dealers can use the CF Coupling to gain these important advantages:

- Reduce original equipment costs
- Cut assembly and installation time
- Provide a closer coupled unit
- Reduce base requirements
- Minimize operational costs

Get full details on the CF Coupling. Ask for Bulletin 606 containing coupling and engine specifications.

Lovejoy FIRST NAME IN FLEXIBLE COUPLINGS

LOVEJOY FLEXIBLE COUPLING CO.

4847 W. Lake St. Chicago 44, Ill.

new literature

Cat Uses Induction Heating Process

If your products require heating for hardening, brazing, annealing or forming operations, a folder by The Ohio Crankshaft Co., Tocco Div., shows a few of the many uses to which the Tocco process has been put by Caterpillar Tractor Co. Cat has developed a variety of Tocco applications and they currently have more than 5000 kw of the equipment in use.

The bulletin shows how this Induction Heating process can speed up production, improve products, and lower production costs.

Importance of Good Grounding During Welding Explained

An article in the form of a 13-page booklet explaining the importance of ground conduction pertaining to welding positioners is available from the Aronson Machine Company. This booklet is packed with important data and information for those interested in furthering the science of welding.

Hole Gauge and Fitting Fixture Described

Complete information on operation, application and cost of Sunnen Service Corp. No. PG-800 gauge and PG-400 setting fixture are contained in Bulletin SSC-B1, just off the press.

Details include large-size pictures of both units as well as interesting examples of how the fixture can be used to set the gauge to dimensions of ½ tenths (0.000050-in.) without the use of masters, rings, or setting blocks.

Remote-Reading Liquid-Level Gauges

A new 8-page, 3-color Catalog No. 338 details the complete line of Jerguson Truscale gauges including standard, red flasher and inclined styles. These gauges are for remote liquid-level indication for storage tanks, etc.

Information on the various styles, models and datum columns simplifies selection of the unit best suited for a specific requirement. Features, operation and application data, and accessories are explained in detail.

Hercules Direct-Injection Diesel Power Units

Two new bulletins (P.U. 502-A and P.U. 504-B) describing Hercules 4- and 6-cyl overhead-valve, direct-injection diesel power units have been issued by Hercules Motors Corp.

The new bulletins, with double-sided, half-page fold-out flaps are photo-illustrated and include complete details, specifications, power charts, dimension drawings, and working-load, quick-reference tables.

P.U. 502-A describes the 4-cyl Model DD226 units, which are available both as open and closed units. These units are furnished as low-profile (standard) units and can be supplied with an external fuel tank. They have 4-in. bore, 4½-in. stroke and develop up to 66 hp at 2000 rpm.

P.U. 504-B describes the 6-cyl Model DD-339 units, also available as closed or open units. These are standard high-profile units. Bore and stroke are 4-in. and 4½-in., respectively and the unit develops up to 100 hp at 2000 rpm.

(*Continued on Page* 81)

A Simple Switch
or a
Full Automatic Control
FOR YOUR ENGINE

Synchro-Start can supply any control requirement of your engine . . .

FULL AUTOMATIC CONTROL
SAFETY ALARM SETS
SPEED SENSITIVE SWITCHES
SOLENOIDS
RELAYS
PRESSURE AND TEMPERATURE SWITCHES
SPECIAL CONTROLS

Write for Complete Information
by sending us your control requirements and engine and installation data.

SYNCHRO-START PRODUCTS, INC.
Since 1932
8151 NORTH RIDGEWAY AVENUE • SKOKIE, ILLINOIS

KIM
Hotstart
electric pre-heater
for Diesel Engines

KIM HOTSTART pre-heaters circulate hot water through engines when they are not in use; protect them against bitter winter weather; keeps engines responsive to the touch of the starter. Lightweight; low cost; high in savings. Thousands in use.

★ *Quick easy starts*
★ *Saves warm-up time*
★ *Reduces engine wear*
★ *Cuts maintenance costs*
★ *Easy to install*

Write for literature.

KIM HOTSTART MANUFACTURING COMPANY
West 917 Broadway, Spokane 1, Washington

FREE FORM FOR Further FACTS

If you would like further information on subjects advertised, new products described or new literature offered

or

if you would like to have us locate information on products or services not currently appearing in

diesel power

you have only to indicate your requests on these postage free post cards

our reader service department will do the rest

void after February 15, 1959
(In U.S. Only)

Please rush me further information on the following products

_____

_____

described on pages ____ ____ ____ ____ ____

NAME _____

COMPANY _____ POSITION _____

ADDRESS _____

☐ please have a salesman call

No Postage Stamp Necessary if Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 638, Sec. 34.9, P. L. & R., Stamford, Conn.

DIESEL PUBLICATIONS, INC.
80 LINCOLN AVENUE
STAMFORD, CONNECTICUT

Postage Will be Paid by Addressee

Postage Will be Paid by Addressee

BUSINESS REPLY CARD

First Class Permit No. 638, Sec. 34.9, P. L. & R., Stamford, Conn.

DIESEL PUBLICATIONS, INC.
80 LINCOLN AVENUE
STAMFORD, CONNECTICUT

No Postage Stamp Necessary if Mailed in the United States

I DON'T WANT TO MISS A SINGLE ISSUE

Please enter immediately my subscription to DIESEL POWER

☐ 1 year at $4.00

☐ 2 years at $7.00

☐ I enclose $..... ☐ Bill my company

NAME (PLEASE PRINT CLEARLY)

TITLE

FIRM

TYPE OF BUSINESS

STREET ADDRESS ☐ This is my home address ☐ office address

CITY ZONE STATE

DIESEL POWER
80 Lincoln Ave.
Stamford, Conn.

HAVE DIESEL POWER SENT TO YOUR HOME

—read it at your leisure . . . but indicate your title and company as we need this information for our files even if copies are addressed to your home.

Are You Reading YOUR OWN PERSONAL COPY of Diesel Power?

• • • • or is this a pass-along copy . . . with pages clipped out . . . months late . . . dog-eared?

DON'T MISS OUT on new developments — new techniques — new ideas for getting greater efficiency, cutting your costs . . . in every issue of DIESEL POWER.

GET YOUR OWN COPY EVERY MONTH—have it sent home where you can read it at your leisure . . . it costs so little—JUST 1¼¢ A DAY!

◀ ◀ ◀ ***MAIL THIS HANDY CARD TODAY to start DIESEL POWER on its way to you.***

SEND NO MONEY NOW-
we'll be glad to bill you later

Consolidated Index Of

1958 Diesel Power Articles

For your convenience, all articles published in 1958 are listed under topical headings.

Industry News and Special Reports

	Month	Page
Looking Ahead at 1958	Jan.	16
Customer Service Builds Sales	Jan.	32
New Diesel-Dial Provides Engine Data	March	18
What Sells Engines	April	28
1958 Diesel, Dual-Fuel and Natural Gas Engine Specifications	April	44
Parts Control by "Push-Button"	May	28
Buyers' Guide	July	43
RoosaMaster School Goes To The Field	August	23
New Units For Old . . . Through Remanufacture	Oct.	56
Training Men For Today's Construction Needs	Nov.	35

Engines and Components
New Designs

	Month	Page
Cummins' Latest—Model HF-6-B	Jan.	26
Second Model for Ford's Industrial Diesel Line	Feb.	24
Injection Pump Improvements Pace Engine Development	Feb.	30
Ford Develops Diesel For Farm Tractor	April	69
American MARC's Diesel Outboard	May	26
Curtiss-Wright Adds Four Mercedez-Benz Models	June	32
Telescopic Valves—A Different Concept	July	28
Cerlist's Model 3—First of Five Planned	July	36
All-Electric Governor Gives Fast, Accurate Response	July	85
A-C Tests Experimental Gas Turbine Tractor	July	89
Lubricators Go Automatic Too	Aug.	18
Deutz Adds Three 712 Series Models	Aug.	27
Cummins' NH-195 Built for Central and Eastern Hauling Operations	Sept.	24
Perkins' "Four 99" Diesel	Sept.	26
Controlled Turbocharging Improves Performance	Sept.	30
Onan 3-KW Diesel Generator Set Features "Vacu-Flo" Air Cooling	Sept.	34
American Bosch Introduces the "PSH"	Nov.	24
New IH Engines now in Production	Nov.	28
Hercules Markets "Jlo" Air-Cooled Diesel Line	Dec.	38

Modifications

	Month	Page
Multiple Small Turbochargers Boost Big Engine Performance	Feb.	22
Turbocharging The O-P Engine	March	30
Turbocooling of Intake Air Proves Effective	April	35
Cummins Controls Overfueling	May	30
Need More Power?—Convert By Turbocharging	June	16
Value of Intercooling	Aug.	14
Crankcase Explosions Need Not Be Serious	Sept.	19

Accessories And Drives
New Designs

	Month	Page
Snubbers Solve Air Line Pulsation Problem	Feb.	26
You Should Protect Your Engine	Feb.	28
Torque Converter Drive For Farm Tractors	April	73
Secondary Filtration Protects Locomotive Diesels	May	18
New Automotive Generator System Features	May	30
Performance Testing Demonstrated Differences In Fuel Filters	July	78
Starting Fluid Setups Meet Every Need	July	88
Generators Designed For Diesel Drive	Aug.	28
"RoadRanger" Transmission Line Expanded and Improved	Aug.	30
Converter Performance Varied By Circuit Design	Sept.	32
Panel-Type Oil-Bath Air Filter For Locomotives	Nov.	30
Wrap-Around Insulation Confines Exhaust Heat	Nov.	37
Torque Converter-Power Shift Transmission Combination For Off-Highway Heavy-Duty Equipment	Dec.	20
Quick Start System For Cold Weather	Dec.	25
Spark-Arrester For Locomotive Exhausts	Dec.	26

Diesel-Powered Equipment
New Designs

	Month	Page
EMD Standardizes Dual-Purpose Locomotive	March	30
Industrial Locomotive Custom-Built For Job	April	62

Clark's New Dozer—It's Most Powerful	April	64
Twin-Bucket Scraper Holds 130-Ton Load	Dec.	16

Operation and Operating Reports

	Month	Page
Greenport Runs Engine Acceptance Tests	Feb.	16
Centralized Control Improves Pipeline Operation	March	14
Western RR's RDC's Top Million Miles With 100% Availability	March	16
Catch Engine Trouble Early	April	38
Runs 25,000 Hours—Needs Only Piston Rings	June	38
Waverly Adds Enterprise RV-16 Engine	Sept.	14
Standby Units Give Protection Plus	Nov.	16
Nantucket Utility Goes Automatic	Nov.	20
Cutting Corners Can Be Costly	Nov.	36

Applications

	Month	Page
No Diesel Power—No Key Defense Systems	Jan.	24
Diesels Fuel Missiles	Jan.	28
Underground Operation With Safety	Jan.	30
Double-Duty In Drilling Tender	Jan.	36
Mobile Units For Power-Hungry Mexico	March	19
Air Drill Rig Cuts Oil Well Drilling Time	April	36
Mobile Units—First On The Job	April	66
Oil Industry Power Packages Now Assembled In Oil Country	April	77
And Now—Diesel Taxi Cabs	May	22
No-Break Power For Vital Unattended Installations	June	22
Diesel Drilling Package Combines Electric And Mechanical Drive	June	24
Bigger Quarry Equipment Boosts Output—Cuts Costs	June	26
Transportable Power—An Asset To Utility Operation	June	28
Equipment Interchangeability Cuts Downtime	June	29
Diesel Standby Makes Wind-Driven Generator Practical—Cuts Costs	June	33
Dieselized Jeeps Go Underground	July	32
Municipality Pre-Plans Mobile Generator Use For Maximum Utility	July	81
Rough Terrain No Problem For Mobile Crane	Aug.	19
Diesel Feed Mill Goes To Farmer	Sept.	36
Pumping "Package" Is Versatile	Nov.	32
Plan Now For Future Flood Control	Nov.	33
Jersey City Cuts Costs of Sewage Treatment	Dec.	14
Diesel-Powered Reefers For The Long Haul	Dec.	18
Packaged Power Plants Have International Appeal	Dec.	34

Maintenance Procedures and Services

	Month	Page
Trucker Uses Scientific Methods To Better Already Good Performance	Feb.	29
Quick Check For GM "71" & "110" Camshaft Timing	Feb.	34
Use Starting Fluids Properly	March	32
The Case Of The PM Governors	March	34
Prepare Liners—Then Install Rings	April	41
PM Is Cheaper Than Repair	May	24
Recognize Types of Crankshaft Failures	June	30
Re-Ring Properly	June	34
Diesels Desludged Without Dismantling	June	37
Stretching Crankshaft Life By Chroming	Oct.	16
Plastic Steel Repairs Liner's Water Side	Oct.	26
Servicing Liners In Aluminum GM Blocks	Oct.	39
Restoring PT Metering Orifices	Oct.	40
Improve Your Piston Ring Performance	Oct.	48
Keep Customers Informed	Dec.	31

Shops and Tooling

	Month	Page
Talking Shops (Series)		
Cummins Diesel Engines, Inc.	March	24
Gerhardt's Inc.	May	14
John M. Walton, Inc.	Aug.	21
Mark Finely-Finished Surfaces Permanently Without Deformation	Jan.	29
Super Service Station Speeds Train Turnaround	July	82
Tractor Engines Power-Proved Right In Place	Sept.	28
Valve Maintenance Improves Operating Efficiency	Oct.	20
Build Your Maintenance Program Around An—Engine Dynamometer	Oct.	23
Machine Lapping For Flatness And Finish	Oct.	28
Precision Pin Fitting Made Easy	Oct.	33
Calibrating And Running-In Unit Injectors	Oct.	44
Injection Tested While Engine Runs	Oct.	59

Fuels And Lubes

	Month	Page
Better Lube Oils Through Research and Test	July	34
Electron Microscope Helps RR Select Economy Fuels	July	40
"Fumigation"—A Potential Fuel Saver	July	72
Selecting Fuel For High-Speed Diesels	Aug.	12
New Problems—New Oils	Aug.	24
A New Concept For Residual Oil Conditioning	Sept.	22
Additive Treatment Cuts Fuel Sludging, Reduces Costs	Dec.	32
Systematized Lubrication Protects $-Million Investment	Dec.	36

1959 ENGINE SPECIFICATIONS are coming in April. 1958 engine specification reprints were sold out early last year. To insure your supply of 1959 reprints, you better reserve them right now.

VELLUMOID
For the Finest Gaskets and Sheet Packing
THE VELLUMOID COMPANY • WORCESTER, MASS.

new literature

(Continued from Page 76)

I-R Standard "K" Line Motorpumps

Twenty sizes of Ingersoll-Rand's new "K" line of Motorpumps that are readily available "off-the-shelf," are outlined in their new 8-page bulletin, Form 70022.

These Motorpumps are offered in sizes of 1/3 through 25 hp for heads to 190 ft and capacities to 775 gpm. They are compact and sturdy, and said to provide dependable, trouble-free operation in many applications.

The new bulletin contains drawings that pinpoint outstanding features of the Motorpumps' impellers, seals, casings and the electric motors that drive them. Selection charts, friction tables and a typical pump work sheet are included. Tables give dimensions of the "K" Motorpumps and some available modifications are listed.

Le Roi Compressor Literature

A 4-color, 12-page bulletin covering Westinghouse unit-type air compressors has been issued by the Le Roi Div. Bulletin SG-2, describes G single-stage, YS single-stage, and YC two-stage Westinghouse compressors from ½ to 15 hp at 80 to 250 psi.

Halftones and cutaway photos illustrate three different models.

Comprehensive specifications list cfm displacements, pressures, weights, dimensions, and rpm of the various models and sizes. Component parts and accessories are explained. A section of the bulletin is devoted to air receiver and auxiliary storage tank specifications and dimensions.

Medium Range, High-Speed Generator Line

The Electric Machinery Mfg. Co. publication 2100-PRD-251 describes a line of high-speed, synchronous generators. These are available from 50 thru 187 kva, 60 or 50 cycles. The units are suitable for engine connection (single bearing) or motor-driven (two bearing).

Their publication 3300-PRD-249 describes a line of NEMA, Class E-2, squirrel-cage induction motor controls. The line is called "Sa-Fuse" because of the safe, fused motor protection it gives. A new, mechanical interlocking system is explained as well as controls mounting methods.

Finger-Flexible Hose

A 6-page, illustrated bulletin on the new Springfield "400" Finger-Flexible Teflon hose for industrial applications has been issued by Titeflex, Inc.

Bulletin No. 400 describes the construction process and means of assembly and attachment for the hose. Specifications and ordering instructions are also given along with a performance chart. The bulletin also lists some of the hydraulic and other applications.

WANTED

Chief engineer with good background in supervising design and application for company engaged in the manufacture of diesel, dual-fuel and spark ignition gas engines. May now be acting at Assistant Chief Engineer's level or equivalent. Salary commensurate with ability and experience. Send complete resume in confidence. Address Box #C1-591, c/o Diesel Power, 80 Lincoln Ave., Stamford, Connecticut.

REPLACEMENT PARTS for CUMMINS ENGINES

models

H — NH — JT — L — LR

let us quote on all your wants for Cummins Engine REPLACEMENT PARTS.

piston rings & sleeves, camshafts, upper rocker parts, cam follow parts, push rods, water pump parts, hose assemblies, fuel lines, injector parts, fuel pump parts, cylinder heads, lube pumps & gaskets.

LEO M. SHANAHAN CO.

4274 So. Hoover St., Los Angeles 37, Calif.
Adams 3-7208 Cable address — LEOSHAN

HILL DIESEL ENGINE

Parts and Service

Models—B-BP-PBM, A-PA-PAM, C-PCM-PC, V-VM, V-B

W. H. W. Machine & Tool Co.

406 Olds Ave., P.O. Box 392, Lansing, Mich.

D.P.S. THERMOMETERS

These instruments are a series of marine type thermometers designed for all diesels and all plant uses—water or oil.

FEATURES All brass construction, nickel finish, cork insulation.

(Repair service available)

No. 416H	No. 426F
◀ Price ▶	
$6.65 ea	$5.70 ea

40 years continuously in the diesel engine business.

Write for catalog.

DIESEL PLANT SPECIALTIES CO.

Box 316
Stevens Point, Wisconsin

we do 1 thing - and we do it very well!

America's largest GM fuel injector rebuilder

interstate

diesel service incorporated
2093 East 19th St., Cleveland 15, Ohio • PR 1-7726

PRODUCTS SOLD THROUGHOUT U. S. AND CANADA BY DEALERS AND DISTRIBUTORS — INQUIRIES WELCOMED

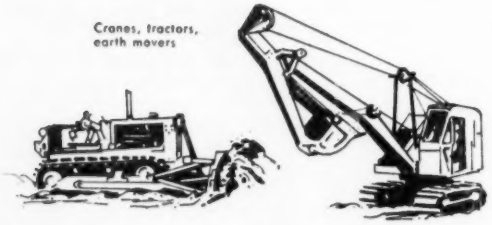
New! Quick Starting Aid for STARTING DIESELS

IN ANY WEATHER

TURNER

QUICK-START

Cranes, tractors, earth movers



Bulldozers, boats, stationary engines.

For all Diesel Trucks

Pull the Quick-Start choke, on the dash, for a couple of seconds, hit the starter and your Diesel is running. Simple to install, easy to operate, Quick-Start is a mixture of ether and petroleum products under pressure in a closed system.

Get up to 240 starts on one fuel charge. Starts all Diesels instantly in sub-zero to hottest climate.

$20.95 F.E.T. included
(less installation)

EXTRA TANKS OF STARTING FUEL $6.50 EACH

SEE YOUR DISTRIBUTOR TODAY

THE TURNER BRASS WORKS
SYCAMORE, ILLINOIS
ESTABLISHED 1871

advertisers index

Albertson & Co., Inc.	55
Allis-Chalmers Mfg. Corp.	12, 13
American Bosch Arma Corp.	35
Association of Diesel Specialists	72, 73
Bacharach Industrial Instrument Co.	70
Baldwin-Lima-Hamilton Corp., Hamilton Div.	29
Bendix Aviation Corp., Eclipse Machine Div.	68
Bosch, Robert Corp.	14
Burgess-Manning Co., Industrial Silencer Div.	71
C.A.V. Ltd.	66
Cooper-Bessemer Corp.	2nd cover
Crane Packing Co., Lapmaster Div.	69
Delco-Remy Div., G. M. Corp.	8, 9
Detroit Diesel Engine Div., G. M. Corp.	21, 22, 23, 24
Diesel Plant Specialties	81
Garrett Corp., AiResearch Div.	2
Gillett & Eaton, Inc.	58
General Motors Corp.	
Delco-Remy Div.	8, 9
Detroit Diesel Engine Div.	21, 22, 23, 24
Harrison Radiator Div.	4
Hall-Toledo, Inc.	65
Hamilton Div., Baldwin-Lima-Hamilton Corp.	29
Harrison Radiator Div., G. M. Corp.	4
Hercules Motors Corp.	3
Interstate Diesel Service, Inc.	81
Kent-Moore Organization, Inc.	10
Kiene Diesel Accessories, Inc.	69
Kim Hotstart Mfg. Co.	75
Koppers Co., Inc.	15
Lix Corp.	74
Lovejoy Flexible Coupling Co.	75
M.A.N. Maschinenfabrik Augsburg-Nurnberg (A.G. Augsburg, Germany)	51
Maxim Silencer Co.	67
Minneapolis-Honeywell Regulator Co.	11
Nicad Div., Gould-National Batteries, Inc.	62
Nugent, Wm. W. Co., Inc.	61
Rockford Clutch Div., Borg-Warner Corp.	63
Schwitzer Corp.	31
Sealed Power Corp.	4th cover
Shanahan, Leo M. Co.	81
Snap-On Tools Corp.	34
Spray Products Corp.	70
Standard Oil Co. of California	17
Standard Oil Co. (Indiana)	3rd cover
Stewart & Stevenson Services, Inc.	27
Sturtevant, P. A. Co.	71
Synchro-Start Products, Inc.	76
Turner Brass Works	82
Tuthill Pump Co.	7
U. S. Aviex Co.	74
Vellumoid Co.	81
Waukesha Motor Co.	41, 42, 43, 44
W. H. W. Machine & Tool Co.	81
White Diesel Engine Div., White Motor Co.	16
Wilkening Mfg. Co.	1
Wyman-Gordon Co.	6
Zollner Corp.	18

SLUDGE *situation gets a clean-up*

STANODIESEL Oil M helps keep diesels clean and running smoothly at Princeton, Missouri

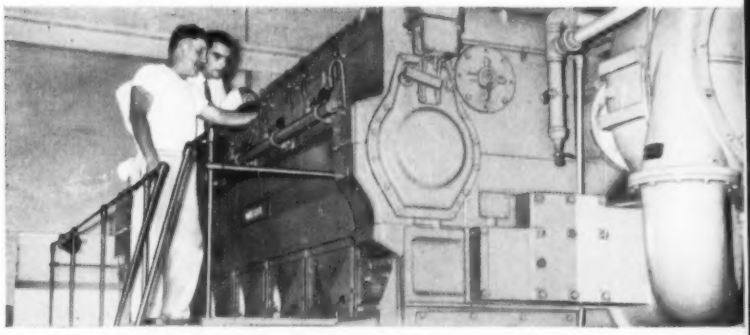
The situation: Consumer Public Service Company, Princeton, Missouri, has three diesels in service—a 225 hp unit installed in 1951, a 1,083 hp unit installed in 1954 and a 1,440 hp unit installed in 1956. In previous equipment, sludging had been a problem, so when these units went into service, a heavy duty oil was recommended—STANODIESEL Oil M.

What has happened: The oil has been inspected regularly by a Standard Oil lubrication specialist. Samples are periodically removed for analysis at Standard's Whiting Indiana research laboratory. Analysis shows the oil to be in excellent condition. Since the 1,440 hp unit was started up in 1956, it has generated 1,672,200 kw hours of electricity.

What you can do: Find out more about how STANODIESEL Oil M can deliver service in your plant. Ask for more information from the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

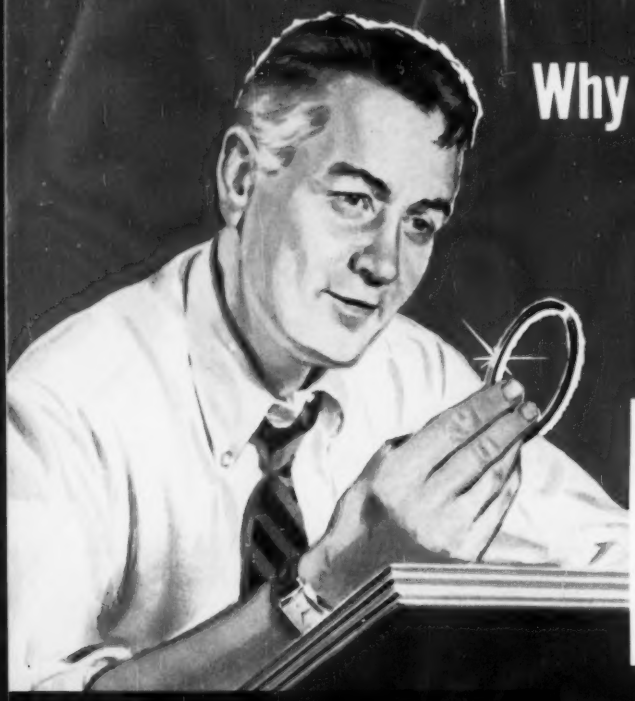
Quick facts about STANODIESEL Oil M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult-to-lubricate parts.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.



Darrel McCormick, Standard Oil lubrication specialist and William Rutledge, plant superintendent, inspect 1,440 hp diesel in Princeton, Missouri plant. Darrel is an experienced hand at this work. He has an engineering degree from Vanderbilt University plus four years' experience in industrial lubrication work at Standard Oil. He has also completed the Standard Oil Sales Engineering School.

You expect more from **STANDARD** *and you get it!*



Why do diesel engineers select Sealed Power Cyclan Piston Rings?

Answer: **They don't break in severe service where other rings have failed!**

Sealed Power metallurgists developed a special alloy iron for diesel applications called Cyclan. Cyclan has great strength, great resiliency . . . will not break under impact. It is chrome-plated for longer life and superior oil control.

If you have encountered trouble with excessive heat, breakage, side wear or friction, Cyclan may be the solution. Discuss your application with Sealed Power's engineers. Write or phone.

All Sealed Power diesel sleeves and sleeve assemblies are designed and manufactured with extreme care in a modern plant built and devoted exclusively to their manufacture. They are matched for top performance and subject to rigid quality controls.

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911
Sealed Power Corporation, Muskegon, Michigan • St. Johns, Michigan • Rochester, Indiana
Detroit Office • 7-236 General Motors Building • Phone Trinity 1-3440

Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Largest Producers of Sealing Rings for Automatic Transmissions and Power Steering Units